

Limited Energy Study
Energy Engineering Analysis Program (EEAP)
Fort Knox, Kentucky

Final Report

Volume 1
Sections 1-3

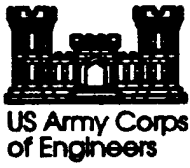
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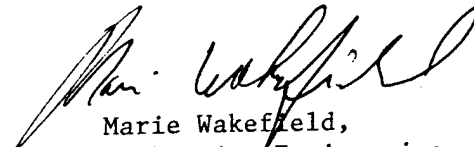


DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
P.O. BOX 9005
CHAMPAIGN, ILLINOIS 61826-9005

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1 EXECUTIVE SUMMARY

1.1 SYNOPSIS

Systems Corp surveyed and completed energy analyses for 37 buildings, and eight ballfields. The energy conservation opportunities (ECOs) evaluated were ceiling reflectance, high efficiency indoor lighting, indoor lighting controls, and ballfield lighting and control systems. Cost estimates were prepared using M-CACES. Life cycle cost analyses were performed using the Life Cycle Cost in Design (LCCID) computer program. Project development brochures (PDBs) and DD1391 forms were prepared for a Energy Conservation Investment Program (ECIP) project. The project that was developed represents \$93,956 in annual savings with favorable simple paybacks and saving to investment ratios (SIRs).

1.2 INTRODUCTION

Systems Engineering and Management Corporation (SYSTEMS/CORP) was contracted by the Louisville District of the United States Army Corps of Engineers in June 1993 to perform a limited energy study for 37 buildings at Fort Knox, Kentucky. In addition, the project includes a ballfield lighting survey of 8 locations.

1.2.1 Scope of Work

1. Evaluated selected energy conservation opportunities (ECOs) to determine their energy savings potential and economic feasibility.
2. Conduct a limited site survey of selected buildings or areas to insure that any methods of energy conservation which are practical and have not been evaluated in any previous energy study have been considered and the results documented.
3. Determine efficiency of existing systems. Determine the replacement option with the highest SIR.
4. Provide complete programming or implementation documentation for all recommended ECOs.

1 EXECUTIVE SUMMARY

5. Prepare a comprehensive report to document the work performed, the results, and the recommendations.

1.2.2 Organization of the Final Report

The submitted material for this report consists of the following:

Volume I: Executive Summary, Methods and Approach, and Programming Document-ECIP Project I

Volume II: Programming Document-ECIP Project (Continued), Scope of Work, Interim Review Meeting Minutes, Interim Review Comments and Responses, and Interim Review Presentation

1.3 PRESENT AND HISTORICAL ENERGY CONSUMPTION

The baseline energy consumption and energy conservation opportunity energy consumption were determined using spreadsheets and manual calculating to model system energy consumption. These have been included in *Section 2* of this report.

1.3.1 Natural Gas Costs

The natural gas consumption and cost for FY92 (October 1991-September 1992) at Fort Knox are shown in *Table 1.3.1, Fort Knox Natural Gas*. *Figure 1.3.1* is a bar graph of the monthly consumption and costs. The natural gas cost used for evaluating the ECOs is as follows:

$$\text{COST/MBTU} = \$3.74/\text{MBTU}$$

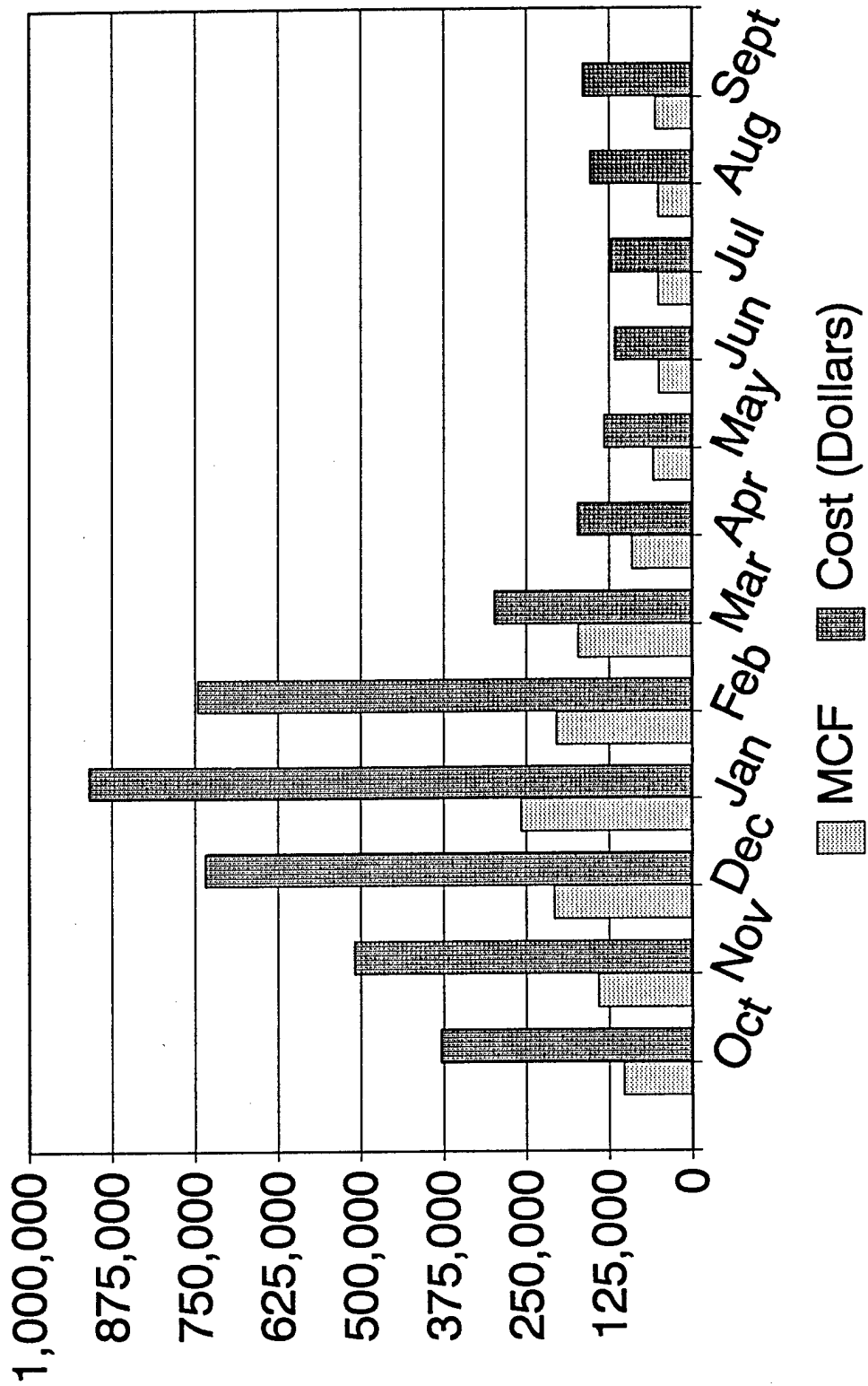
TABLE 1.3.1
FORT KNOX NATURAL GAS
Oct 91 - Sept 92

MONTH	DEMAND	CONSUMPTION MCF	COST	COST/MCF
Oct 91	14,616	103,670	\$379,995	\$3.665
Nov	14,616	141,650	510,079	3.601
Dec	11,000	208,531	734,825	3.524
Jan	11,034	259,223	909,415	3.508
Feb	12,559	205,339	746,795	3.637
Mar	12,559	171,895	297,539	1.731
April	12,559	91,273	172,523	1.890
May	12,559	59,090	133,344	2.257
Jun	12,559	50,734	116,873	2.304
Jul	12,559	51,981	122,570	2.358
Aug	12,559	51,954	154,449	2.973
Sept	12,559	56,458	166,220	2.944
TOTAL	151,738	1,451,798	\$4,444,627	3.06
Min	11,000	50,734	116,873	1.731
Max	14,616	259,223	909,415	3.665
Avg	12,645	120,983	370,385	2.866

FIGURE 1.3.1

FORT KNOX

FY92 Natural Gas



1 EXECUTIVE SUMMARY

1.3.2 Electric Costs

The electric energy consumption, demand, and costs for FY92 are shown in *Table 1.3.2 Fort Knox Electric*. *Figure 1.3.2* is a bar graph of the monthly consumption and cost. The electric cost used to calculate the electric cost savings for the project is as follows:

COST/KWH	= \$0.02506/KWH (No Demand)
COST/MBTU	= \$7.343/MBTU (No Demand)
COST/KW	= \$7.067/KW (Monthly Demand)

1.4 ENERGY CONSERVATION OPPORTUNITIES INVESTIGATED

Systems Corp analyzed four energy conservation opportunities (ECOs) at Fort Knox, Kentucky. The analysis was performed utilizing energy models developed by Systems Corp and data collected during the field survey of the facilities at Fort Knox. Each ECO was evaluated to determine the potential energy savings, dollar savings, implementation costs, simple payback, life cycle cost, and savings to investment ratio (SIR). The four ECOs that were evaluated are as follows:

ECO - 1 Ceiling Reflectance

ECO - 2 High Efficiency Indoor Lighting

ECO - 3 Indoor Lighting Controls

ECO - 4 Ballfield Lighting and Controls

Systems Corp's energy analysis models were used to determine the savings achieved for implementing each ECO in the facilities that were evaluated. The U.S Army Corp of Engineers M-CACES software was used to estimate the implementation cost of each ECO in each facility evaluated. The U.S Army Corp of Engineers Life Cycle Cost in Design, Version 1.0, Level 72, software was used to perform life cycle cost analyses and determine the SIR of each ECO for each facility evaluated.

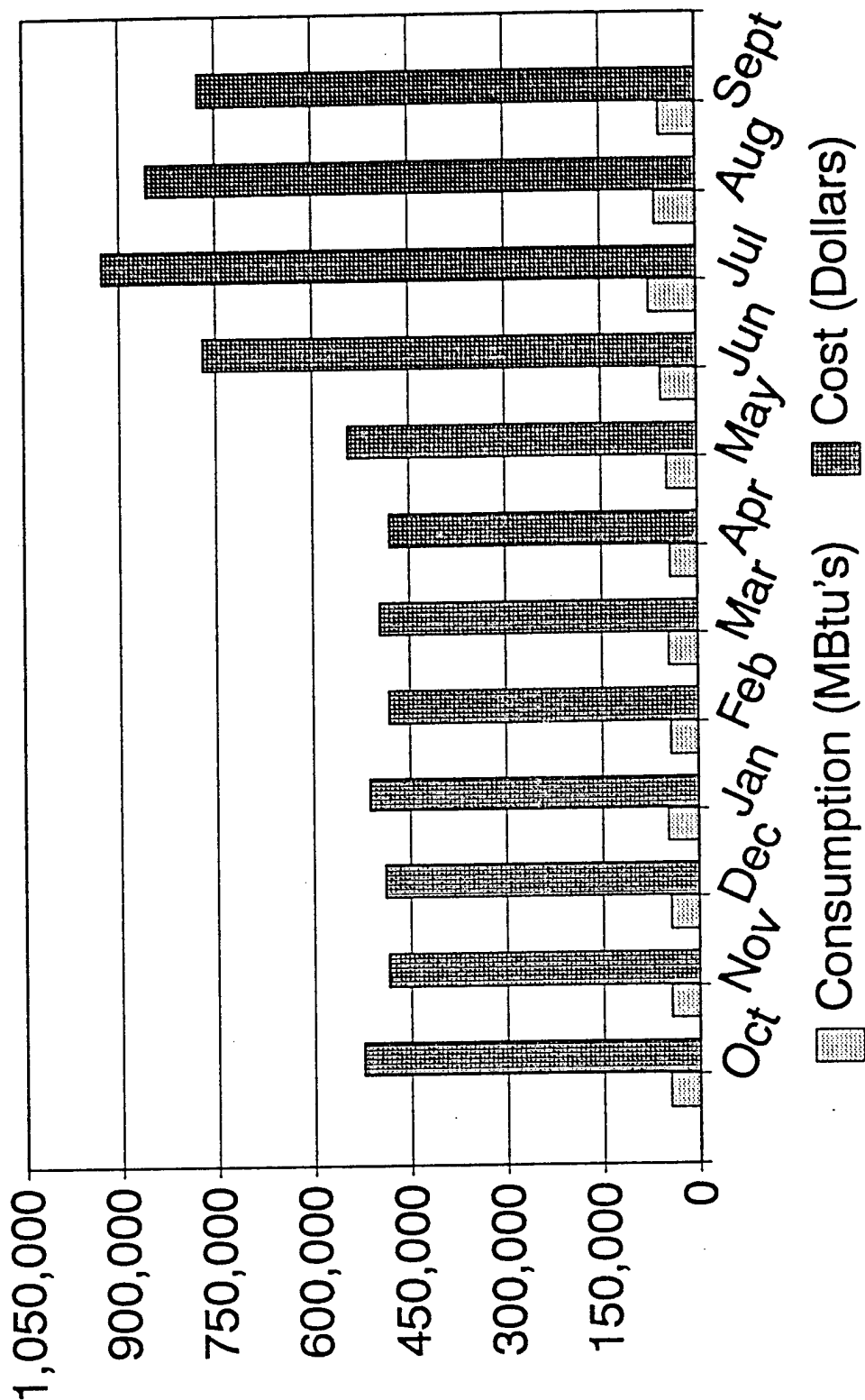
TABLE 1.3.2
FORT KNOX ELECTRIC
Oct 91 - Sept 92

MONTH	DEMAND KW	CONSUMPTION KWH	COST DEM & CONS	COST/KWH
Oct 91	28,950	13,601,000	\$524,094	\$.039
Nov	24,650	13,109,000	484,546	.037
Dec	24,950	13,205,000	488,850	.037
Jan	25,850	13,954,000	513,317	.037
Feb	25,250	12,886,000	482,755	.037
Mar	24,800	13,579,000	497,273	.037
April	25,100	12,891,000	481,931	.037
May	30,650	14,006,000	545,004	.039
Jun	41,700	16,504,000	769,708	.047
Jul	44,400	21,867,000	927,163	.042
Aug	44,300	19,172,000	858,772	.045
Sept	41,250	16,933,000	776,615	.046
TOTAL	381,850	181,707,000	\$7,350,028	\$.040
Min	24,650	12,886,000	\$481,931	\$.037
Max	44,400	21,867,000	927,163	.047
Avg	31,820	15,142,250	612,502	.040

FIGURE 1.3.2

FORT KNOX

FY92 Electric



1 EXECUTIVE SUMMARY

1.4.1 ECOs Recommended

Systems Corp recommended that the following ECOs be implemented due to favorable simple pay backs and savings investment ratios (SIRs).

ECO - 2 High Efficiency Indoor Lighting

ECO - 3.1 Indoor Lighting Controls (On/Off Photocells)

ECO - 4 Ballfield Lighting and Controls

1.4.2 ECOs Rejected

ECO-1, Ceiling Reflectance, was rejected due to the fact that the potential energy savings was found to be quite small for each building that was evaluated. The implementation costs for each building evaluated did not represent a large investment, but when compared to the savings resulted in simple paybacks in excess of thirty years. Improving the ceiling reflectance did not yield an acceptable simple payback in any of the buildings evaluated. ECO-3.2, Dimming and On/Off Photocell Control, was rejected. ECO-3.1, on/off photocell control, has a better SIR and SPB than ECO-3.2.

1.4.3 ECIP Projects Developed

Systems Corp developed one ECIP project. The project include the improvement of lighting efficiency in 16 buildings, installation of lighting controls in 23 buildings, and the improvement of lighting efficiency at 3 ballfields and lighting control at 8 ballfields. The following table summarizes the savings and investment for each ECO included in the ECIP project.

TABLE 1.4.3

ECIP PROJECT SUMMARY

		1st Yr Savings	Investment	SIR	SPB(yrs)
ECO-2	INDOOR LIGHTING EFFICIENCY	\$50,872	\$277,658	2.08	5.46
ECO-3.1	INDOOR LIGHTING CONTROLS	\$38,595	\$113,162	3.88	2.93
ECO-4	BALLFIELD LIGHTING & CONTROLS	\$4,489	\$20,122	2.60	4.48
TOTAL ECIP PROJECT		\$93,956	\$410,942	2.61	4.37

2 METHODS AND APPROACH

2.1 FIELD SURVEY

The field survey as performed by Systems Corp was designed to provide the necessary data required to complete the project. It was also designed to provide residual benefits to the installation by providing an organized and readily available source of information which can be used in future years. The information was transmitted in the form of field notes made on standardized survey forms. The field survey forms were submitted with the interim report.

The survey forms were designed to allow notations of all data which could be utilized (not necessarily required) to calculate the energy savings gained by implementing a specific energy conservation opportunity. These forms contain data obtained from as-built drawings and confirmed in the field as well as data obtained only in the field.

2 METHODS AND APPROACH

2.1.1 Buildings

Thorough preparation for the building survey was required to assure that the data required to perform the technical analysis is obtained. The building surveys were performed in a manner which assured the best results. A simple listing of each step of the process best describes our approach to the surveys.

1. The list of ECOs included in the work scope were reviewed in detail.
2. Each ECO was given an identification number which is used consistently throughout this project.
3. An expanded description of each ECO was formulated to outline the possible methods for implementation of the ECO.
4. Survey forms were developed for each ECO to provide space to enter and data which might possibly be used in performing the engineering and economic analysis of the ECO.
5. A list of the types of as-built drawings required for the buildings was prepared based on the information required on the ECO survey forms.
6. A Systems Corp representative assisted during the survey in gathering the necessary as-built drawings.
7. Due to the age of drawings, it was determined that most required information would need to be gathered during the survey at the buildings.
8. The building surveys were then performed, confirming or revising data obtained from the drawings. Additional data was obtained as required.
9. Systems Corp's survey team met with the post energy coordinator throughout the survey on an as needed basis.

Table 2.1.1.1 is a list of the buildings surveyed sorted by building type.

**TABLE 2.1.1.1
BUILDINGS SURVEYED**

BUILDING TYPE	BUILDING NUMBER	BUILDING AREA
ADMINISTRATIVE	63	21,054
	TOTAL AREA THIS TYPE	21,054
WAREHOUSE	86	21,716
	92	13,298
	58	10,091
	59	10,091
	60	10,091
	TOTAL AREA THIS TYPE	65,287
AIRCRAFT HANGAR	5220	50,027
	5222	35,392
	5256	20,179
	5253	18,905
	TOTAL AREA THIS TYPE	124,503
MACHINE SHOP	73	13,580
	TOTAL AREA THIS TYPE	13,580
GENERAL MAINTENANCE SHOP	94	30,894
	TOTAL AREA THIS TYPE	30,894
AIRCRAFT MAINTENANCE SHOP	5232	13,639
	TOTAL AREA THIS TYPE	13,639

TABLE 2.1.1.1
BUILDINGS SURVEYED

BUILDING TYPE	BUILDING NUMBER	BUILDING AREA
VEHICLE MAINTENANCE SHOP	2770	111,566
	2778	53,494
	2730	26,985
	5901	22,786
	159	20,833
	486	20,180
	158	18,271
	2942	17,220
	2943	17,220
	482	16,923
	483	16,479
	484	16,479
	485	16,479
	487	16,479
	TOTAL AREA THIS TYPE	391,394
TANK MAINTENANCE SHOP	2944	21,840
	2970	7,421
	2969	7,421
	2963	7,220
	2971	6,900
	2972	6,900
	2973	6,900
	2974	6,900
	2979	6,900
	2980	6,900
	TOTAL AREA THIS TYPE	85,302

2 METHODS AND APPROACH

2.1.2 Ballfield Lighting

The exterior lighting survey was performed in much the same way as the building survey. The approach for the ballfield lighting survey was to survey the specified locations on the post. A listing of the steps required to complete this task are as follows:

1. The ECO was reviewed in detail and given an identification number.
2. An expanded description of the ECO was formulated to outline the possible methods of implementation.
3. A survey form was developed.
4. Site maps were reviewed and survey locations were identified.
5. A preliminary site survey was performed to establish fixture distances, mounting height and fixture layouts.
6. Sketches of the locations and preliminary data were prepared for field notes.
7. Lamp wattage information was obtained from the high voltage electrical maintenance staff.
8. A daylight survey of each location was performed to identify fixture and lamp types, wattage and voltage.
9. A nighttime survey was performed to measure light levels at each of the surveyed locations.

Table 2.1.2.1 is a listing of the areas surveyed for ballfield lighting.

TABLE 2.1.2.1
BALLFIELDS SURVEYED

AREA NUMBER	AREA NAME	FIXTURES CURRENTLY IN USE			
		1000W INCAN	1500W QUARTZ	1000W MH	1500W MH
2358	GARY OWENS REGIMENT	36			
2388 N	BLACK HORSE/HELL ON WHEELS		29		
2388 S	BLACK HORSE/HELL ON WHEELS		28		
4557	KEYS PARK				26
5913	DISNEY AREA			39	
6532	2ND DRAGON/BACHLER			28	
6609	TURRETT FIELD				48
6647	EAST-WEST				50

2 METHODS AND APPROACH

2.2 CALCULATIONS

Energy calculations were performed using computerized techniques. Due to the large volume of calculations to be performed, standardized procedures were developed for the computer models. This assured consistent results and uniformity of quality in all of the calculations performed.

2.2.1 Baseline Energy Consumption

The following sections will describe the method for calculating the baseline energy consumption for each of the four ECOs.

2.2.1.1 Baseline Energy Consumption: ECO - 1

The baseline energy consumption for this ECO was calculated using a LOTUS123 spreadsheet. This spreadsheet modeled the energy consumption of the heating system with the existing insulation. The energy consumption was modeled using field measurements and weather bin data. The heating system efficiency was assumed to be 55%. This took into account boiler efficiency, distribution losses and unit heater efficiency.

Table 2.2.1.1.1 lists the baseline energy consumption for this ECO.

TABLE 2.2.1.1.1
BASELINE ENERGY
CONSUMPTION ECO-1

BUILDING NUMBER	BASELINE ENERGY CONSUMPTION (MBTU)
58	184.480
59	184.480
60	184.480
86	113.080
92	48.850
158	82.320
159	82.320
482	75.090
483	75.090
484	75.090
485	75.090
486	75.090
487	49.760
5253	41.160

2 METHODS AND APPROACH

2.2.1.2 Baseline Energy Consumption: ECO - 2

The baseline energy consumption for this ECO was calculated using a LOTUS 123 spreadsheet. This spreadsheet modeled the energy consumption of the existing lighting system by utilizing the following:

1. Existing fixture and lamp type (i.e. fluorescent, mercury vapor, etc.)
2. Lamp wattage.
3. Ballast wattage.
4. Hours of use.

The above information was obtained during the field survey. *Table 2.2.1.2.1* lists the baseline energy consumption for this ECO.

2.2.1.3 Baseline Energy Consumption: ECO - 3

The baseline energy consumption for this ECO was calculated using a LOTUS123 spreadsheet. The energy consumption was modeled using field measurements and local climatological data for Fort Knox. This spreadsheet modeled the energy consumption of the existing lighting control system by utilizing the following:

1. Existing fixture and lamp type (i.e. fluorescent, mercury vapor, etc.)
2. Lamp wattage.
3. Ballast wattage.
4. Hours of use.

The above information was obtained during the field survey. *Table 2.2.3.1* lists the baseline energy consumption for this ECO.

**TABLE 2.2.1.2.1
BASELINE ENERGY
CONSUMPTION ECO-2**

BUILDING NUMBER	BASELINE ENERGY CONSUMPTION (MBTU)
58	73.646
59	109.591
60	103.588
63	322.013
73	86.089
86	236.466
92	103.892
482	107.677
483	134.598
484	107.677
485	127.868
486	131.831
487	35.891
2770	2,786.940
2778	604.306
5232	16.355

TABLE 2.2.1.3.1 **BASELINE ENERGY** **CONSUMPTION ECO-3**

BUILDING NUMBER	BASELINE ENERGY CONSUMPTION (MBTU)
86	23.770
94	445.640
158	220.960
159	820.250
2770	1,150.044
2730	193.800
2778	399.321
2942	108.940
2943	108.940
2944	207.970
2963	58.140
2969	58.140
2970	58.140
2971	58.140
2972	58.140
2973	58.140
2974	58.140
2979	58.140
2980	58.140
5220	1,016.730
5222	331.880
5253	248.910
5256	1,578.610

2 METHODS AND APPROACH

2.2.1.4 Baseline Energy Consumption: ECO - 4

The baseline energy consumption for this ECO was calculated using a LOTUS123 spreadsheet. This spreadsheet modeled the energy consumption of the existing lighting system by utilizing the following:

1. Existing fixture and lamp type (i.e. fluorescent, mercury vapor, etc.)
2. Lamp wattage.
3. Ballast wattage.
4. Hours of use.

The above information was obtained during the field survey. *Table 2.2.4.1* lists the baseline energy consumption for this ECO.

TABLE 2.2.1.4.1
BALLFIELD LIGHTING
BASELINE ENERGY CONSUMPTION

ECO NUMBER	BALLFIELD NUMBER	BALLFIELD NAME	BASELINE ENERGY CONSUMPTION (MBTU)
4.1	2358	GARY OWENS REGIMENT	127.745
4.1	2388 N	BLACK HORSE/ HELL ON WHEELS	154.36
4.1	2388 S	BLACK HORSE/ HELL ON WHEELS	149.04
4.2	2358	GARY OWENS REGIMENT	33.915
4.2	2388 N	BLACK HORSE/ HELL ON WHEELS	38.096
4.2	2388 S	BLACK HORSE/ HELL ON WHEELS	34.181
4.2	4557	KEYS PARK	148.56
4.2	5913	DISNEY AREA	148.121
4.2	6532	2ND DRAGON/BACHLER	106.342
4.2	6609	TURRETT FIELD	274.306
4.2	6647	EAST-WEST	185.736

2 METHODS AND APPROACH

2.3 ENERGY CONSERVATION OPPORTUNITIES

Systems Corp analyzed four distinct energy conservation opportunities (ECOs) at Fort Knox, Kentucky. The analysis was performed utilizing energy models developed by Systems Corp and data collected during the field survey of the facilities at Fort Knox. Each ECO was evaluated to determine the potential energy savings, dollar savings, implementation costs, simple payback, life cycle cost and savings to investment ratio (SIR). The four ECOs that were evaluated are as follows:

ECO - 1 Ceiling Reflectance

ECO - 2 High Efficiency Indoor Lighting

ECO - 3 Indoor Lighting Controls

ECO - 4 Ballfield Lighting and Controls

Systems Corp's energy analysis models were used to determine the savings achieved for implementing each ECO in the facilities that were evaluated. The U.S Army Corp of Engineers M-CACES software was utilized to estimate the implementation cost of each ECO in each facility evaluated. The U.S Army Corp of Engineers Life Cycle Cost in Design, Version 1.0, Level 72, software was used to perform life cycle cost analyses and determine the SIR of each ECO for each facility evaluated.

2.3.1 ECO - 1: Ceiling Reflectance

This ECO evaluated the use of a spray-applied acoustical insulation. The objective was to increase the reflectance value of the ceiling as well as improve the ceiling's insulation value. The energy savings were based on the heating system savings due to the added insulation. The calculations for this ECO were performed using weather bin data field notes and manufacturer's data. It is estimated the spray-applied acoustical insulation will cost between \$.60 and \$.80 per square foot for material and labor. It was determined based on the energy savings and current roof and ceiling conditions that no building will meet the required twenty (20) years or less simple payback. No life cycle cost analysis or cost estimate were performed.

2 METHODS AND APPROACH

2.3.2 ECO - 2: High Efficiency Indoor Lighting

Many options were available which would fulfill this ECO. The goal was to increase the lighting efficiency in the buildings as much as possible while still being cost effective. The following is a list and description of the options implemented in the buildings. All options are not evaluated in all buildings due to applicability.

1. *Four (4) Foot Fluorescent Fixtures:* Replace existing T12 lamps with T8 lamps and electronic ballasts. Reflectors are used in some fixtures to reduce the required number of lamps. This is a one-for-one fixture replacement.
2. *Eight (8) Foot Fluorescent Fixtures:* Replace existing fixtures with high pressure sodium fixtures. The number of fixtures are reduced while maintaining or increasing the lighting levels to the recommended settings.
3. *Incandescent Lighting:* Existing incandescents are replaced with T8 fluorescent lamps and electronic ballasts or high pressure sodium fixtures.
4. *Mercury Vapor Fixtures:* Existing mercury vapor fixtures are replaced with high pressure sodium fixtures. This is a one-for-one replacement.

2.3.3 Indoor Lighting Controls

The objective in this ECO was to reduce the hours required to operate the building lighting system while maintaining the required light levels. The buildings evaluated under this ECO receive significant daylighting through highbay doors or building windows for at least six (6) months throughout of the year. The amount of daylight available to the Fort Knox area was determined using the Climatological Data. All options are not evaluated in all buildings due to applicability. The following is a list and a description of the options implemented in the buildings.

1. *On/Off Photocell Control:* Based on the light readings obtained during the field survey, a quantity of fixtures were identified to be controlled by photocells. If a photocell indicates the recommended light level is being contributed by the daylight, the lighting fixtures controlled by the photocell will turn off automatically.

2 METHODS AND APPROACH

2. *Dimming and On/Off Photocell Controls:* This option is the same as Option 1 except the lighting fixtures not controlled by the on/off photocells can be controlled by a dimming system. This second option allows for an additional amount of savings due to the available daylighting. The dimming fixtures will also be controlled by a photocell. In addition, the dimming system will allow those fixtures to be reduced to a 60% energy load when the necessary daylight is available.

2.3.4 ECO - 4: Ballfield Lighting and Controls

This ECO evaluated two (2) savings opportunities. The goal for ECO-4.1 was to increase the lighting efficiency at the ballfields as much as possible while still being cost effective. All ballfields were evaluated to use metal halide fixtures to replace the existing lighting system. It was assumed the ballfield lighting systems operate approximately 1,040 hours each year. ECO-4.2 evaluated the use of a control system on the ballfield lights. The following describes the controls evaluated for ECO-4.2:

1. *Photocell:* A photocell would eliminate the unnecessary use of the ballfield lighting system during daylight hours.
2. *Four (4) Hour Timer:* A timer would reduce the unnecessary use of the ballfield lighting system during night time hours.

facility

INTERIOR/BALLFIELD LIGHTING REPLACEMENT AND
LIGHTING CONTROL INSTALLATION
Fort Knox, Kentucky

project coordinator for using service

Gary Meredith

functional requirements summary, PDB-1

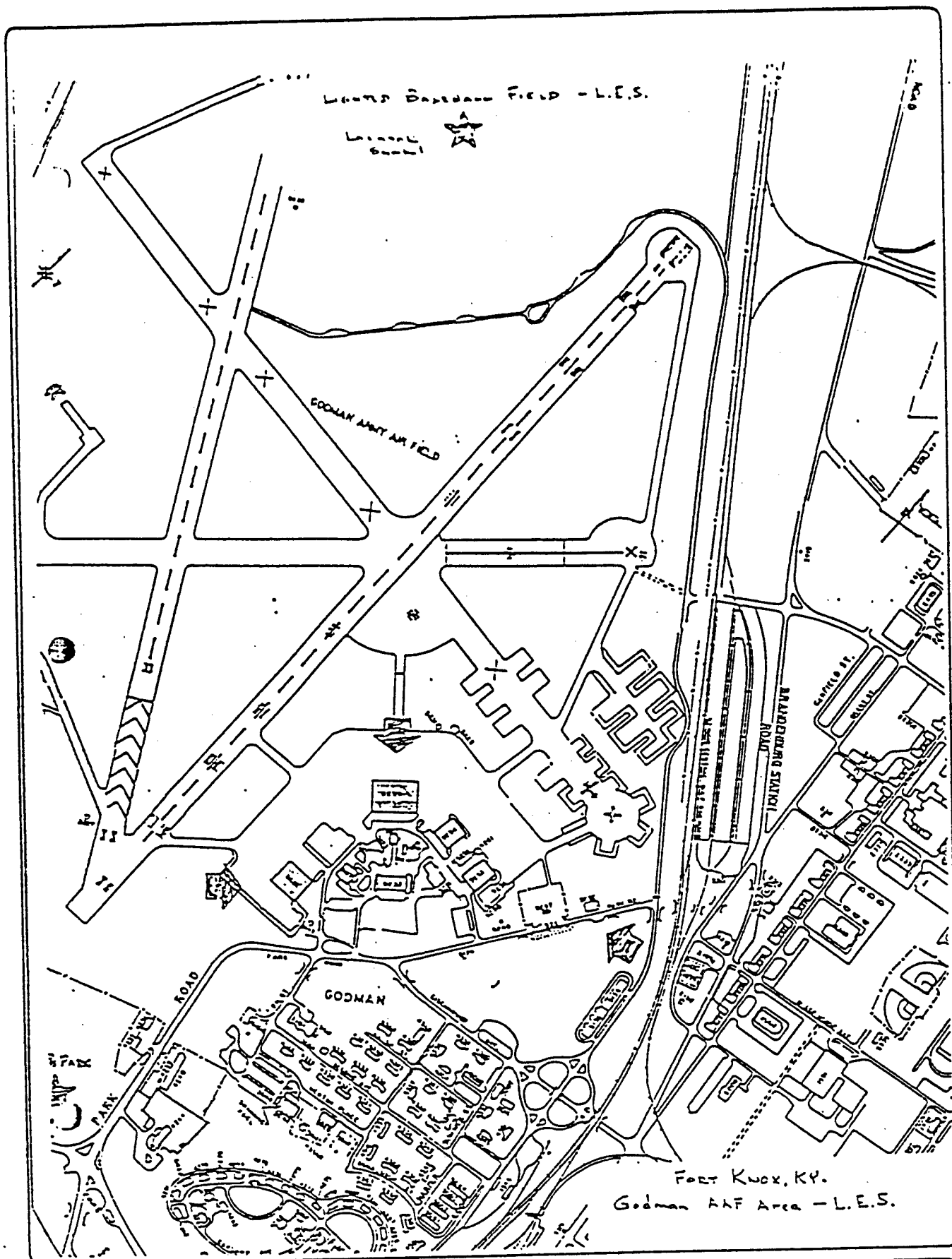
3-1

OBJECTIVE:

The objective of this project is to install lighting controls and replace existing interior and ballfield lighting with higher efficiency fixtures and lamps. The installation of controls and replacement of the existing lighting will reduce energy consumption and life cycle operating costs for the subject facilities in accordance with the Army Energy Resources Management Plan (ERMP) and Executive Order 12759.

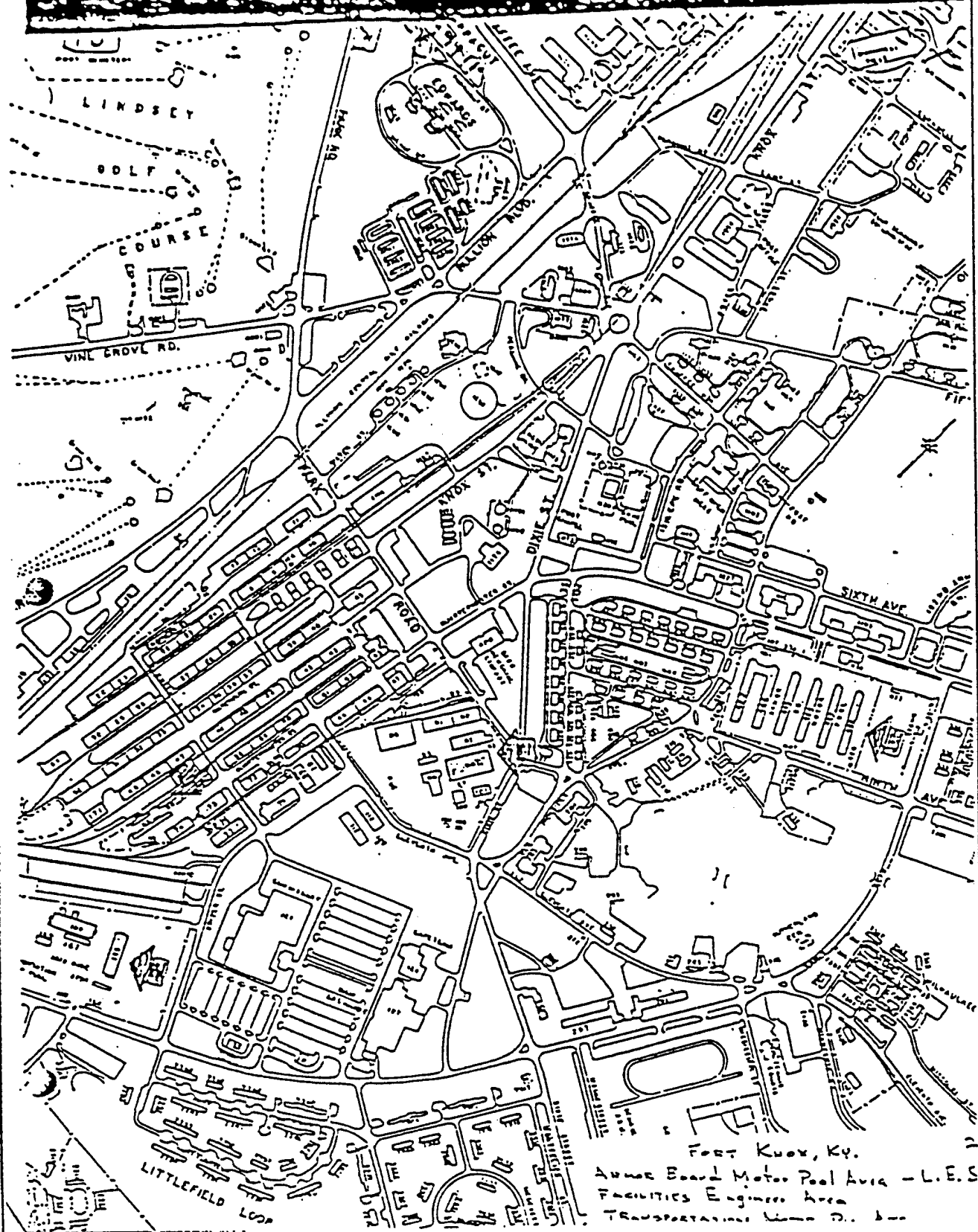
functional requirements summary, PDB-1

13-2



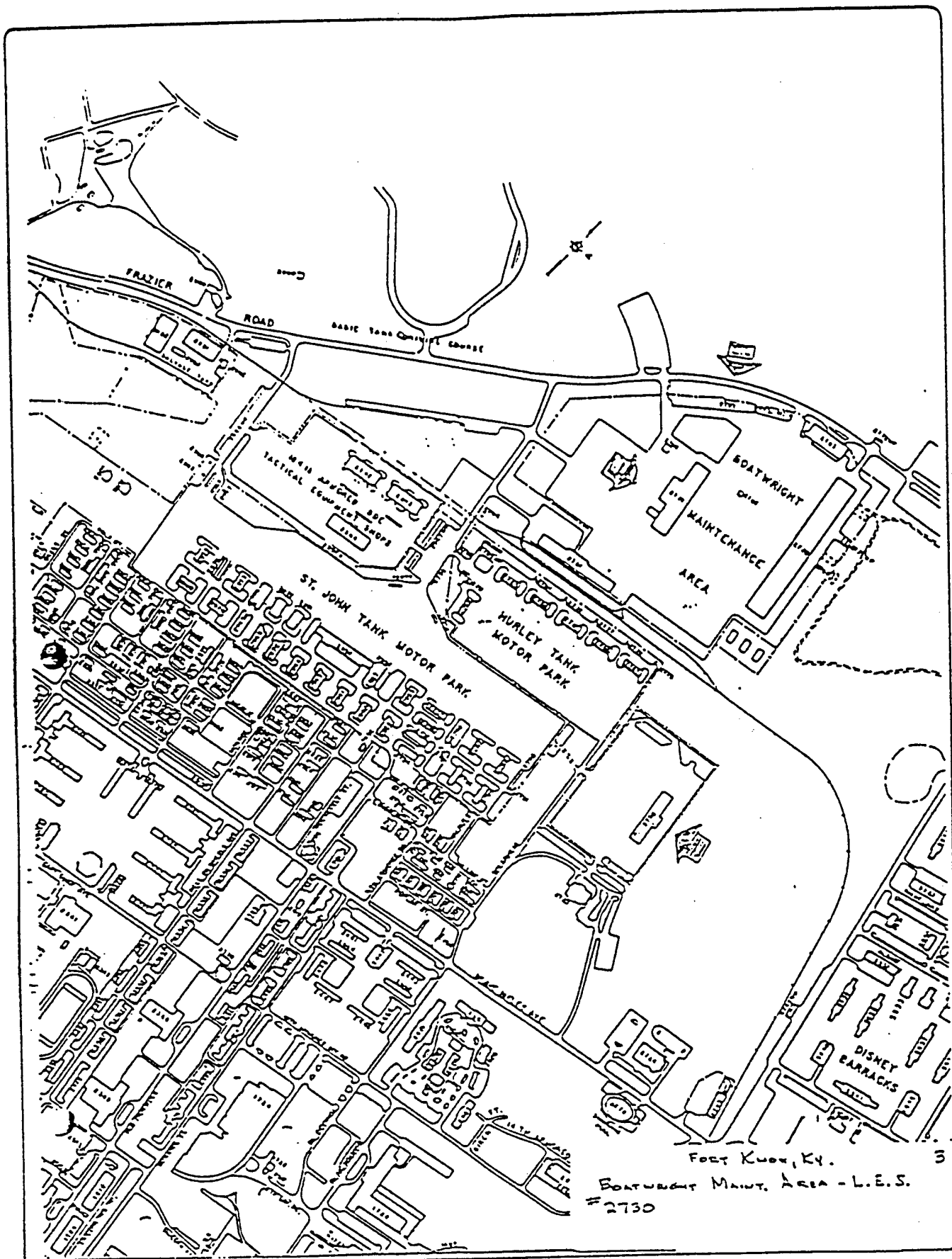
facilities requirements sketch, PDB- 1/2

3-3



facilities requirements sketch, PDB- 1/2

3-4



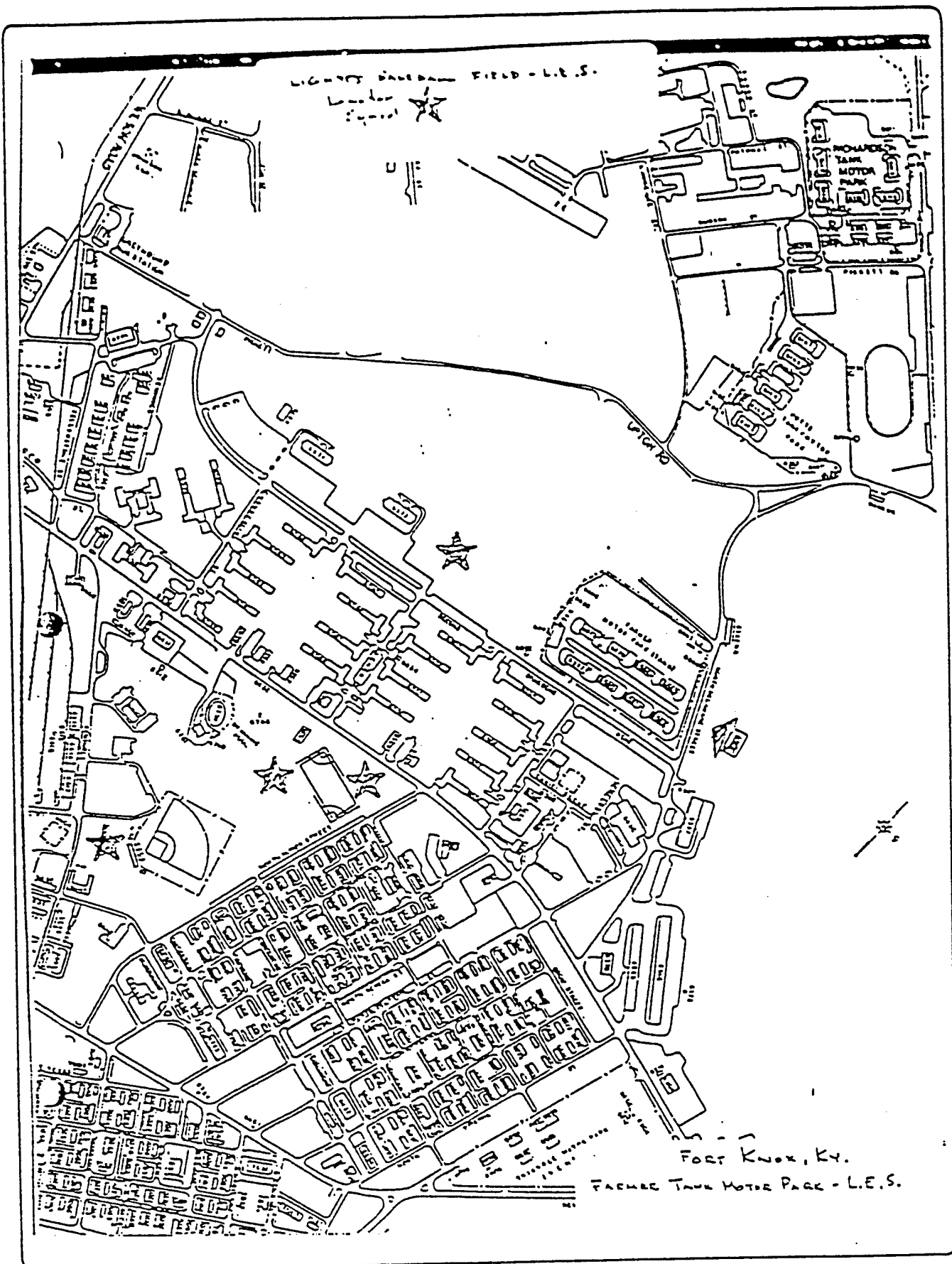
facilities requirements sketch, PDB- 1/2

3-5



facilities requirements sketch, PDB- 1/2

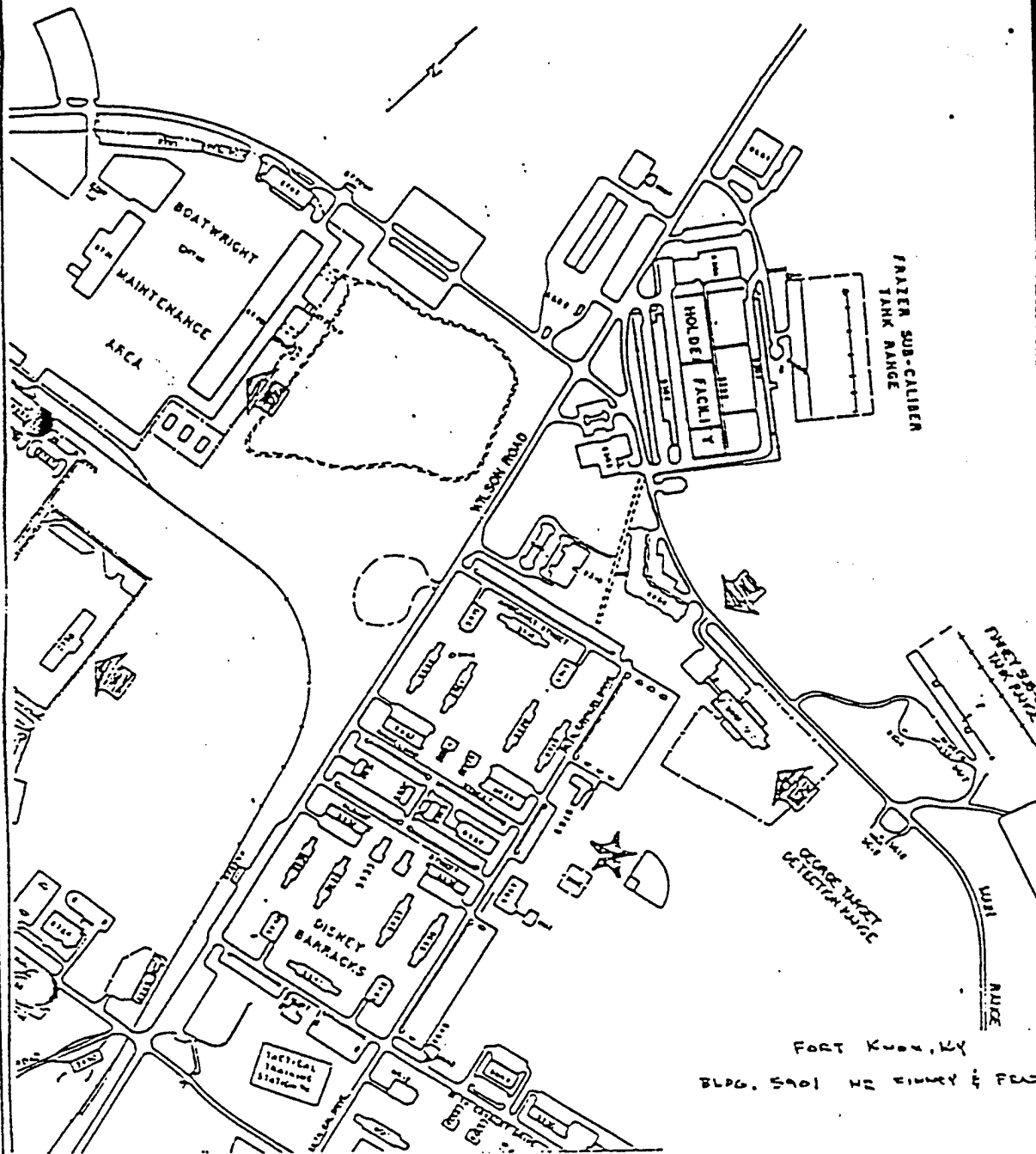
3-6



facilities requirements sketch, PDB- 1/2

3-7

Licensed Ballroom Field - L.E.S.



FORT KUON, KY

BLDG. 5401 HQ ENGINE & POWER-LE

facilities requirements sketch, PDB- 1/2

3-8

APPENDIX C
DOCUMENTATION CHECKLIST

A. SPECIAL CONSIDERATIONS

ITEM		Required or Not Required	To Be Determined	Comment Attached	Document Attached
A-1	Cost estimates for each primary and supporting facility	R	D		1
A-2	Telecommunications system coordination with USACC and authorization for exceptions	NR			
A-3	Coordination with state and local governmental requirements (blind vendors, medical facilities, construction and operating permits, clearinghouse coordination, etc.)	R	A		
A-4	Assignment of airspace	NR			
A-5	Economic analysis of alternatives	R	D		
A-6	Approval for new starts	NR			
A-7	International balance of payments (IBOP) coordination with U.S. European command and NATO—overseas cost estimates and comparables (include rate of exchange used in estimates)	NR			
A-8	Impact on historic places—on site survey by authorized archeologist and coordination with state historic preservation officer and advisory council on historic preservation	NR			
A-9	Exceptions to established criteria	NR			
A-10	Coordination with various staff agencies (Provost Marshall-physical security, etc.)	R			
A-11	Identification of related or support projects (so projects can be coordinated)	R			
A-12	Required completion date	R			
Other Special Considerations (List and number items)					
1. See Appendix A					

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TO BE DETERMINED — Information needed but not currently available. Enter code for information source.

COMMENT ATTACHED — Significant information summarized or explained and attached.

DOCUMENT ATTACHED — Significant information is in an existing document which is attached.

*** BY WHOM** (Check and insert appropriate letter)

A — DFAE

B — Using Service

C — Construction Service

D — Designer

E — Other (Check Comments Attached and explain)

documentation checklist

3-10

B. SITE DEVELOPMENT

ITEM		Required or Not Required	To Be Determined	Comment Attached	Document Attached
B-1	Consultation with the District Office to determine and evaluate flood plain hazards	NR			
B-2	Preparation, submission, and/or approval of new	NR			
(A)	General Site Plan	NR			
(B)	Annotated General Site Plan	NR			
(C)	Sketch Site Plan	R			
(D)	Facilities Requirements Sketch				
B-3	Preparation of	NR			
(A)	Site Survey	NR			
(B)	Subsoil information				
B-4	Approval by Department of Defense Explosive Safety Board (DDESB) for Safety Site Plan	NR			
	Other Site Development Considerations (List and number items)				
	1. See Project Development Brochure, PDB-1/2				

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documentation checklist

3-11

C. ARCHITECTURAL & STRUCTURAL

ITEM		Required or Not Required	To Be Determined	Comment Attached	Document Attached
C-1	Reconciliation with troop housing programs and requirements	NR			
C-2	Evaluation of existing facilities (including degree of utilization)	R	D		1
C-3	Approval for removal and relocation of existing usable facilities	NR			
C-4	Evaluation of off-post community facilities	NR			
C-5	Storage and maintenance facilities (including nuclear weapons)	NR			
C-6	Coordination hospitals, medical and dental facilities with Surgeon General	NR			
C-7	Coordination of aviation facilities with FAA	NR			
C-8	Coordination air traffic control and navigational aids with USACC	NR			
C-9	Tabulation of types and numbers of aircraft	NR			
C-10	Evaluation of laboratory, research and development, and technical maintenance facilities	NR			
C-11	Coordination chapels with Chief of Chaplains	NR			
C-12	Review food service facilities by USATSA	NR			
C-13	Automated data processing system or equipment approvals—cost analysis when ADP and/or communication centers not co-located with related facilities	NR			
C-14	Coordination postal facilities with U.S. Postal Service Regional Director	NR			
C-15	Laundry and dry cleaning facilities coordination with ASD(I&L)	NR			
C-16	Tenant facilities coordination with installation where sited	NR			
C-17	Facilities for or exposed to explosions, toxic chemicals, or ammunition—review by DDESB (See also Item B-4)	NR			
C-18	Analysis of deficiencies	R	D		1
C-19	Consideration of alternatives	R	D		2
C-20	Determination whether occupants will include physically handicapped or disabled persons	NR			
C-21	As-built drawings for alterations or additions	R	C		
C-22	Availability of Standard Design or site adaptable designs	NR			
Other Architectural & Structural (List and number items)					
1. See Supplemental Data Detailed Project Justification Paragraph D3.					
2. See Supplemental Data Detailed Project Justification Paragraph D4.					

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E — Other (Check Comments Attached and explain)

documentation checklist

3-12

D. MECHANICAL, ELECTRICAL, & UTILITY SYSTEMS

ITEM		Required or Not Required	To Be Determined	Comment Attached	Document Attached
D-1	Fuel considerations and cost comparison analysis	R	D		
D-2	Energy requirements appraisal (ERA)	R	D		
D-3	Conformance with DOD Energy Reduction requirements	R	D		
D-4	Evaluation of existing and/or proposed utility systems	R	D		
Other Mechanical and Utility Systems (List and number items)					
1. See Special Requirements, Paragraph 3 (SRP-3)					

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E — Other (Check Comments Attached and explain)

documentation checklist

3-13

E. ENVIRONMENTAL CONSIDERATIONS

ITEM	
E-1	Environmental impact assessment
E-2	EIA conclusions require Environmental Impact Statement
E-3	Determination of health, environmental or related hazards. Assistance to determine existence of any health, environmental or related hazard may be requested from Aberdeen Proving Ground, MD 21010, the Office of the Surgeon General, Attn: DASG-HCH (Army Environmental Hygiene Agency)
E-4	Air/water pollution permit, coordination with agencies and compliance with standards at Federal, state and local level
E-5	Corrective measures associated with Environmental Impact Statements or assessment—list separately and evaluate.
Other environmental considerations (list and number items)	
1. See Supplemental Data Detailed Project Justification Paragraph D9.	

Required or Not Required	To Be Determined	Comment Attached	Document Attached
R	D		1
NR			
NR			
NR			
NR			

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documentation checklist

3-14

APPENDIX D
TECHNICAL DATA CHECKLIST

A. SPECIAL CONSIDERATIONS

ITEM		Required or Not Required	To Be Determined	Comment Attached	Document Attached
A-1	Factors of risk, restriction or unusual circumstance expected to increase costs beyond applicable area averages	NR			
A-2	Construction phasing requirements	R	D		
A-3	Functional support equipment (mechanical, electrical, structural, and security) to be built in	NR			
A-4	Equipment in place and justification	NR			
A-5	Other equipment and furniture (O&MA, OPA) and costs	NR			
A-6	Special studies and tests (hazards analyses, compatibility testing, new technology testing, etc.)	NR			
A-7	Type of construction (permanent, temporary, semi-permanent)	NR			
A-8	Government furnished equipment (quantities, procurement time, availability and special handling and storage requirements). Funds used for procurement.	NR			
Other special considerations (list and number items)					

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D — Designer

E — Other (Check Comments Attached and explain)

technical data checklist

3-16

B. SITE DEVELOPMENT

ITEM		Required or Not Required	To Be Determined	Comment Attached	Document Attached
B-1	Construction restrictions or guidelines pertaining to site access and preferred construction routes	R	A		
(A)					
(B)	Airfield clearance, explosive storage, working hours, safety, etc.	NR			
(C)	Facilities and/or functions of adjoining areas (structures, materials, impact)	R	A		
B-2	Real estate actions (acquisition, disposal, lease, right-of-way)	NR			
B-3	Demolition/relocation required (data)				
(A)	Special considerations due to explosives/radioactivity/chemical contamination/asbestos emissions/toxic gases	R	A	1	
(B)	Restrictions on disposal of demolished/relocated material including hazardous waste	NR			
B-4	Pavement types and requirements (including traffic surveys and MTMC coordination)	NR			
B-5	Landscape considerations				
(A)	Protection of existing vegetation	R	A		
(B)	Stockpile topsoil	NR			
Other Site Development (List and number items)					
1. There is a possibility that the existing lighting may contain PCB's in the ballasts.					

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- A — DFAE
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- D — Designer
- E — Other (Check Comments Attached and explain)

technical data checklist

3-17

C. ARCHITECTURAL & STRUCTURAL

ITEM		Required or Not Required	To Be Determined	Comment Attached	Document Attached
C-1	Vibration-producing equipment requiring isolation	R	D		
C-2	Seismic zone and other design load criteria (typhoon, hurricane, earthquake loads, high or low loss potential)	NR			
C-3	Protective shelter evaluation and resistant design criteria (conventional/nuclear blast and radiation, chemical/biological)	NR			
C-4	Unusual foundation requirements (pier, pile, caisson, deep foundations, mat, special treatment, permafrost areas, soil bearing)	NR			
C-5	Designation and strength of units to be accommodated	NR			
C-6	Requirements and data for special design projects	NR			
C-7	Unusual floor and roof loads (water, equipment)	NR			
C-8	Security features (arms rooms, vaults, interior secure areas)	NR			
Other Architectural & Structural (List and number items)					

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- E — Other (Check Comments Attached and explain)

technical data checklist

3-18

D. MECHANICAL, ELECTRICAL & UTILITY SYSTEMS

ITEM		Required or Not Required	To Be Determined	Comment Attached	Document Attached
D-1	Special mechanical requirements or considerations (elevator, crane, hoist, etc.)	NR			
D-2	Special peak usage periods and peak leveling techniques	NR			
D-3	Maintenance considerations (accessibility of equipment, compatibility with existing equipment)	R	D		
D-4	Plumbing—availability, general system type and characteristics (proposed and/or existing, incl. compressed air and gas)	R	D		
D-5	Heating—availability, general system type and characteristics (proposed and/or existing)	NR			
D-6	Ventilating, air condition/refrigeration—availability, general system type and characteristics (proposed and/or existing)	R	D		
D-7	Electrical—availability, general system type and characteristics incl. airfield lighting, communication, etc. (proposed and/or existing)	NR			
D-8	Water supply/waste treatment—availability, general system type and characteristics (proposed and/or existing)	NR			
D-9	Energy requirements/fuel conversion (sources, availability, loads, types of fuel, etc.)	R	D		
D-10	Solar energy evaluation	NR			
Other Mechanical & Utility Systems (List and number items)					

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project. Enter "NR" if item is irrelevant and is not required for this project.

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- E — Other (Check Comments Attached and explain)

technical data checklist

'3-19

E. ENVIRONMENTAL CONSIDERATIONS

ITEM		Required or Not Required	To Be Determined	Comment Attached	Document Attached
E-1	Waste water treatment, air quality, and solid waste disposal criteria	NR			
	Other Environmental Considerations (List and number items)				

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A — DFAE

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E — Other (Check Comments Attached and explain)

technical data checklist

3-20

F. FIRE PROTECTION

ITEM

F.1

Special fire protection systems or features (detection and suppression equipment, hazards, etc.)

Other Fire Protection Considerations (List and number items)

Required or
Not Required

To Be
Determined

Comment
Attached

Document
Attached

NR

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project. Enter "NR" if item is irrelevant and is not required for this project.

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E — Other (Check Comments Attached and explain)

technical data checklist

3-21

1. COMPONENT ARMY	FY 19 <u>94</u> MILITARY CONSTRUCTION PROJECT DATA			2. DATE 05 November 93	
3. INSTALLATION AND LOCATION Fort Knox, Kentucky		4. PROJECT TITLE INTERIOR/BALLFIELD LIGHTING REPLACEMENT AND LIGHTING CONTROL INSTALLATION			
5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER ECIP #1	8. PROJECT COST (\$000) \$411		
9. COST ESTIMATES					
ITEM		U/M	QUANTITY	UNIT COST	COST (\$000)
Primary Facility					
Interior and Exterior Light Fixtures and Controls		Lot	1	\$355,794	\$356
Subtotal					\$356
Contingency (10%)					\$36
Total Contract Cost					\$392
Supervision, Inspection and Overhead (5.0%)					\$19
Total Request					\$411
10. DESCRIPTION OF PROPOSED CONSTRUCTION					
<p>The existing interior lighting is a combination of standard efficiency fluorescent fixtures, incandescents, and mercury vapor. The existing ballfield lighting is a combination of incandescents and quartz. The proposed project will replace the interior lighting fixtures with T-8's fluorescents and high efficiency electronic ballasts or high pressure sodium fixtures. The implementation of this project will save 5436 MBtu/Yr of electrical energy. The first year savings is \$93,956 and the Savings to Investment Ratio (SIR) is 2.61.</p>					
11. REQUIREMENT					
<p>Project: The proposed interior ballfield lighting and light control project replaces sixteen (16) buildings and three (3) ballfield locations lighting with energy efficient lighting and installs lighting controls at twenty-three (23) buildings and (8) ballfields.</p> <p>Requirement: The project is required to reduce the energy consumption of lighting and to comply with the Army Energy Resources Management Plan (ERMP) and Executive Order 12759. The proposed project will reduce annual energy consumption by 5736 MBTU/YR and annual energy cost by \$93,956</p> <p>Current Situation: The existing lighting in building numbers T58, T59, T60, 63, 73, 86, 92, 482-487, 2770, 2778, 5232, and ballfields 2358, 2388N and 2388S is inefficient fluorescent, incandescent, quartz and mercury vapor. The controls at buildings 86, 94, 158 159, 2770, 2730, 2778, 2942-2944, 2963, 2969-2974, 2979, 2980, 5220, 5222, 5253, 5256 and ballfields 2358, 2358N, 2388S, 4557, 5913, 6532, 6609, and 6647 are on/off switches.</p>					

1. COMPONENT ARMY	FY 19 <u>94</u> MILITARY CONSTRUCTION PROJECT DATA		2. DATE 05 November 93									
3. INSTALLATION AND LOCATION Fort Knox, Kentucky												
4. PROJECT TITLE INTERIOR/BALLFIELD LIGHTING REPLACEMENT AND LIGHTING CONTROL INSTALLATION		5. PROJECT NUMBER ECIP #1										
<p>Impact if not provided: If the proposed project is not funded, a reduction of 5725 MBtu/YR cannot be achieved, and excessive amounts of energy will continue to be used. There will be no contribution to energy reduction goals established for United States Army facilities by Army Headquarters.</p> <p style="text-align: center;">_____ Colonel, USA Commanding</p> <table> <tr> <td>ESTIMATED CONSTRUCTION START:</td> <td>October 1994</td> <td>INDEX:</td> </tr> <tr> <td>ESTIMATED MIDPOINT OF CONSTRUCTION:</td> <td>April 1995</td> <td>INDEX:</td> </tr> <tr> <td>ESTIMATED CONSTRUCTION COMPLETION:</td> <td>November 1995</td> <td>INDEX:</td> </tr> </table> <p style="text-align: center;">DETAILED JUSTIFICATIONS</p> <p>D1. GENERAL</p> <p>The proposed project encompasses the replacement of lighting in sixteen (16) buildings and three (3) ballfields, and installation of lighting controls in twenty-three (23) buildings and eight (8) ballfields. The project will decrease the energy consumption of the lighting system without reducing light levels except where necessary.</p> <p>D2. ACCOMMODATIONS NOW IN USE:</p> <p>The existing lighting systems are comprised of standard efficiency fluorescent, incandescent, quarts, and mercury vapor fixtures.</p> <p>D3. ANALYSIS OF DEFICIENCY:</p> <p>Currently, sixteen (16) buildings and three (3) ball fields are using standard or low efficiency fixtures for lighting. The purpose of this project is to replace the existing lighting with new light fixtures which are much more efficient, and install lighting controls at twenty-three (23) buildings and eight (8) ballfields. The current deficiency results in large amount of energy usage to maintain adequate lighting.</p>				ESTIMATED CONSTRUCTION START:	October 1994	INDEX:	ESTIMATED MIDPOINT OF CONSTRUCTION:	April 1995	INDEX:	ESTIMATED CONSTRUCTION COMPLETION:	November 1995	INDEX:
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1. COMPONENT ARMY	FY 19 <u>94</u> MILITARY CONSTRUCTION PROJECT DATA		2. DATE 05 November 93
3. INSTALLATION AND LOCATION Fort Knox, Kentucky			
4. PROJECT TITLE INTERIOR/BALLFIELD LIGHTING REPLACEMENT AND LIGHTING CONTROL INSTALLATION		5. PROJECT NUMBER ECIP #1	
<p>D4. CONSIDERATION OF ALTERNATIVES:</p> <p>The only alternatives to proposed project are to install lower efficiency light fixtures. The disadvantages of using lower efficiency light fixtures is that less energy savings can be realized without significantly reducing the construction cost. If a less efficient light fixture is selected, the project would have a lower SIR.</p> <p>D5. CRITERIA FOR PROPOSED PROJECT:</p> <p>The proposed project will conform with all applicable federal and United States Army Regulations.</p> <p>D6. PROGRAM FOR RELATED EQUIPMENT:</p> <p>No equipment funded from appropriations other than MCA are required.</p> <p>D7. DISPOSAL OF PRESENT ASSETS:</p> <p>Light fixtures in sixteen (16) buildings and three (3) ballfields will be disposed.</p> <p>D8. SURVIVAL FACILITIES:</p> <p>The proposed project is not suitable for inclusion of protective shelters.</p> <p>D9. SUMMARY OF ENVIRONMENTAL CONSEQUENCES:</p> <p>The proposed project has been analyzed and will not adversely impact the environment. Energy savings resulting from the project will conserve natural resources.</p> <p>D10. EVALUATION OF FLOOD HAZARDS AND ENCROACHMENT ON WETLANDS:</p> <p>It has been determined that these facilities are not located in a flood plain and they do not encroach on wetlands.</p> <p>D11. ECONOMIC JUSTIFICATION:</p> <p>The proposed project qualifies under ECIP Guidelines in AR-415-15. SIR for the project is 2.61 with a simple payback of 4.37 years. See Economic Analysis, SRP-1</p>			

1. COMPONENT ARMY	FY 19 <u>94</u> MILITARY CONSTRUCTION PROJECT DATA		2. DATE 05 November 93
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<p>D12. UTILITY AND COMMUNICATION SUPPORT:</p> <p>A. No related utility support projects are programmed. Adequate utilities are available to support the project.</p> <p>B. No telecommunication support is required.</p> <p>D13. PROTECTION OF HISTORIC PLACES AND ARCHEOLOGICAL SITES:</p> <p>The project involves the replacement of light fixtures located in existing buildings and family housing areas. Review procedures have been implemented for this project in accordance with 36 CFR 800. The review has established that there will be no effect.</p> <p>D14. PROJECT DEVELOPMENT BROCHURE (PART 1):</p> <p>A Project Development Brochure was prepared on 05 November 93 and is attached as a part of the programming documentation.</p> <p>D15. ENERGY REQUIREMENTS:</p> <p>The proposed project will reduce present energy consumption by 5436 MBtu/Yr at the cost savings of \$93,956 per year. See Energy Requirements Appraisal (ERA) in Special Requirements, Paragraph 3 (SRP-3).</p> <p>D16. PROVISION FOR THE HANDICAPPED:</p> <p>No provisions for the handicapped will be made since the scope of the project is in no way applicable to designing for the handicapped.</p> <p>D17. REAL PROPERTY MAINTENANCE ACTIVITY (RPMA) ANALYSIS:</p> <p>A. Physical impact: There will be light fixtures removed and replace by the same number of light fixtures. No new structures will be added.</p>			

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3. INSTALLATION AND LOCATION Fort Knox, Kentucky												
4. PROJECT TITLE INTERIOR/BALLFIELD LIGHTING REPLACEMENT AND LIGHTING CONTROL INSTALLATION		5. PROJECT NUMBER ECIP #1										
<p>B. Operations and Maintenance (O&M) impact:</p> <table style="margin-left: auto; margin-right: auto; border: none;"> <thead> <tr> <th style="text-align: left; padding-bottom: 5px;"><u>YEAR</u></th> <th style="text-align: center; padding-bottom: 5px;"><u>O&M NET CHANGE (\$000)</u></th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">1994</td> <td style="text-align: center; padding: 5px;">0.0</td> </tr> <tr> <td style="padding: 5px;">(BOD)</td> <td style="text-align: center; padding: 5px;">0.0</td> </tr> <tr> <td style="padding: 5px;">1995</td> <td style="text-align: center; padding: 5px;">0.0</td> </tr> <tr> <td style="padding: 5px;">1996</td> <td style="text-align: center; padding: 5px;">0.0</td> </tr> </tbody> </table> <p style="margin-top: 20px;">C. Backlog of Maintenance and Repair (BMAR) impact:</p> <p style="margin-top: 10px;">There will be no net change in the number of fixtures or in fixture life expectancy. There will be no effect on BMAR.</p> <p style="margin-top: 20px;">D18. COMMERCIAL ACTIVITIES:</p> <p style="margin-top: 10px;">The proposed project is not a "New Start Expansion" as defined by DA Circular 235-1. The project has been reviewed in light of the requirements of commercial and industrial facilities. It has been determined that whereas the project does not affect commercial facilities, the requirements of DA Circular 235-1 does not apply.</p>			<u>YEAR</u>	<u>O&M NET CHANGE (\$000)</u>	1994	0.0	(BOD)	0.0	1995	0.0	1996	0.0
<u>YEAR</u>	<u>O&M NET CHANGE (\$000)</u>											
1994	0.0											
(BOD)	0.0											
1995	0.0											
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1. COMPONENT ARMY	FY 19 <u>94</u> MILITARY CONSTRUCTION PROJECT DATA	2. DATE 05 November 93																																																																																					
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<p>SPECIAL REQUIREMENTS PARAGRAPH 1 (SRP-1):</p> <p>Life Cycle Cost Analysis Project Title: Interior/Exterior Lighting Replacements Fiscal Year: 1994 Analysis Date 11/05/93 Economic Life: Fifteen (15) Years</p> <p>1. INVESTMENT</p> <table style="width: 100%;"> <tr> <td style="width: 80%;">A. CONSTRUCTION COST</td> <td style="text-align: right;">\$373,580</td> </tr> <tr> <td>B. SIOH</td> <td style="text-align: right;">\$18,681</td> </tr> <tr> <td>C. DESIGN COST</td> <td style="text-align: right;">\$18,681</td> </tr> <tr> <td>D. ENERGY CREDIT CALC</td> <td style="text-align: right;">-0-</td> </tr> <tr> <td>E. SALVAGE VALUE</td> <td style="text-align: right;">-0-</td> </tr> <tr> <td>F. TOTAL INVESTMENT</td> <td style="text-align: right;">\$410,942</td> </tr> </table> <p>2. ENERGY SAVINGS ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS</p> <table style="width: 100%;"> <thead> <tr> <th style="text-align: left;">FUEL</th> <th style="text-align: center;">COST \$Mbtu (1)</th> <th style="text-align: center;">SAVINGS MBtu/YR(2)</th> <th style="text-align: center;">ANNUAL \$ SAVINGS(3)</th> <th style="text-align: center;">DISCOUNT FACTOR(4)</th> <th style="text-align: center;">DISCOUNTED SAVINGS(5)</th> </tr> </thead> <tbody> <tr> <td>A. ELECT</td> <td style="text-align: center;">7.34</td> <td style="text-align: center;">5436</td> <td style="text-align: right;">\$89,404</td> <td style="text-align: center;">11.77</td> <td style="text-align: right;">\$1,020,077</td> </tr> <tr> <td>B. DIST</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C. RESID</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D. NG</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>E. COAL</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>F. TOTAL</td> <td></td> <td style="text-align: center;">5436</td> <td style="text-align: right;">\$89,401</td> <td></td> <td style="text-align: right;">\$1,020,077</td> </tr> </tbody> </table> <p>3. NON-ENERGY SAVINGS</p> <table style="width: 100%;"> <tr> <td style="width: 80%;">A. ANNUAL RECURRING</td> <td style="text-align: right;">\$4,555</td> </tr> <tr> <td> (1)DISCOUNT FACTOR</td> <td style="text-align: center;">11.12</td> </tr> <tr> <td> (2)DISCOUNTED SAVINGS</td> <td style="text-align: right;">\$50,692</td> </tr> </table> <p>B. NON-RECURRING SAVINGS</p> <table style="width: 100%;"> <thead> <tr> <th style="text-align: left;">ITEM</th> <th style="text-align: center;">SAVINGS(+) COST(-)(1)</th> <th style="text-align: center;">YEAR OF OCCURRENCE(2)</th> <th style="text-align: center;">DISCOUNT FACTOR</th> <th style="text-align: center;">DISCOUNTED SAVINGS(+) COST (-)(4)</th> </tr> </thead> <tbody> <tr> <td>a. Lighting Replacement</td> <td style="text-align: center;">-0-</td> <td style="text-align: center;">-0-</td> <td style="text-align: center;">-0-</td> <td style="text-align: center;">-0-</td> </tr> <tr> <td>b. Lighting Controls</td> <td style="text-align: center;">-0-</td> <td style="text-align: center;">-0-</td> <td style="text-align: center;">-0-</td> <td style="text-align: center;">-0-</td> </tr> <tr> <td>c.</td> <td></td> <td style="text-align: center;">-0-</td> <td style="text-align: center;">-0-</td> <td style="text-align: center;">-0-</td> </tr> <tr> <td>d. Total</td> <td style="text-align: center;">-0-</td> <td style="text-align: center;">-0-</td> <td style="text-align: center;">-0-</td> <td style="text-align: center;">-0-</td> </tr> </tbody> </table> <p>C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+)/COST(-) \$50,652</p>			A. CONSTRUCTION COST	\$373,580	B. SIOH	\$18,681	C. DESIGN COST	\$18,681	D. ENERGY CREDIT CALC	-0-	E. SALVAGE VALUE	-0-	F. TOTAL INVESTMENT	\$410,942	FUEL	COST \$Mbtu (1)	SAVINGS MBtu/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)	A. ELECT	7.34	5436	\$89,404	11.77	\$1,020,077	B. DIST						C. RESID						D. NG						E. COAL						F. TOTAL		5436	\$89,401		\$1,020,077	A. ANNUAL RECURRING	\$4,555	(1)DISCOUNT FACTOR	11.12	(2)DISCOUNTED SAVINGS	\$50,692	ITEM	SAVINGS(+) COST(-)(1)	YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR	DISCOUNTED SAVINGS(+) COST (-)(4)	a. Lighting Replacement	-0-	-0-	-0-	-0-	b. Lighting Controls	-0-	-0-	-0-	-0-	c.		-0-	-0-	-0-	d. Total	-0-	-0-	-0-	-0-
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1. COMPONENT ARMY	FY 19 <u>94</u> MILITARY CONSTRUCTION PROJECT DATA	2. DATE 05 November 93						
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4. PROJECT TITLE INTERIOR/BALLFIELD LIGHTING REPLACEMENT AND LIGHTING CONTROL INSTALLATION		5. PROJECT NUMBER ECIP #1						
<p>SPECIAL REQUIREMENTS PARAGRAPH 1 (SRP-1) (continued)</p> <p>D. PROJECT NON ENERGY QUALIFICATION TEST (1) 25% NON ENERGY CALC</p> <table> <tr> <td>4. FIRST YEAR DOLLAR SAVINGS</td> <td>\$93,956</td> </tr> <tr> <td>5. TOTAL NET DISCOUNTED SAVINGS</td> <td>\$1,070,729</td> </tr> <tr> <td>6. DISCOUNTED SAVINGS RATIO</td> <td>2.61</td> </tr> </table>			4. FIRST YEAR DOLLAR SAVINGS	\$93,956	5. TOTAL NET DISCOUNTED SAVINGS	\$1,070,729	6. DISCOUNTED SAVINGS RATIO	2.61
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1. COMPONENT ARMY	FY 19 <u>94</u> MILITARY CONSTRUCTION PROJECT DATA	2. DATE 05 November 93
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4. PROJECT TITLE INTERIOR/BALLFIELD LIGHTING REPLACEMENT AND LIGHTING CONTROL INSTALLATION		5. PROJECT NUMBER ECIP #1
<p>SPECIAL REQUIREMENTS PARAGRAPH 3 (SRP-3):</p> <p>Energy Requirements Appraisal (ERA)</p> <p>1. Project Description: Replace existing lighting systems with more efficient lighting systems without reducing the light levels.</p> <p>2. Estimated Energy Consumption: The building are currently lit by standard efficiency lighting. The existing lighting system consumes 14,041 MBtu/Yr of energy. Replacing the existing lighting with high efficiency lighting will result in 5436 MBtu/Yr of electrical energy savings, a thirty-nine percent (39%) reduction in current energy consumption.</p> <p>3. Energy Sources: No new energy sources are required for the proposed project. The use of solar energy for this project is impractical.</p> <p>4. Energy Use Impacts: The proposed project will substantially reduce the consumption of electricity for lighting. The burden on the existing base distribution system will be lessened.</p> <p>5. Energy Conservation: The proposed project will reduce annual energy consumption by 5436 MBtu/Yr with annual energy cost savings of \$93,956. The project complies with Army Resources Management Plan (ERMP) and Executive Order 12759.</p> <p>6. Energy Alternatives: The proposed project represents the greatest possible reduction in energy consumption thirty-nine (39%), without reducing the current lighting levels. The current levels do not exceed the levels recommended by ASHRAE.</p> <p>7. Energy Effects: The proposed project provides positive environmental effects. It reduces the current energy consumption by thirty-nine (39%), effectively reducing the consumption of non-renewable fuel sources. The degrading of environmental standards would not make more efficient energy sources available.</p> <p>8. Basis of Approval: Total energy requirements and alternative fuel sources have been considered and included in this appraisal or discarded as applicable.</p>		

FORT KNOX LIMITED ENERGY STUDY

SUMMARY OF ENERGY SAVINGS

ECO NUMBER	BUILDING NUMBER	BASELINE ENERGY (MBTU)	ECO ENERGY (MBTU)	ENERGY SAVINGS (MBTU)	1ST YEAR SAVINGS	INVESTMENT COSTS	SPB (YR)	SIR
2	T58	73.646	27.395	46.251	\$1,068	\$6,889	6.45	1.76
2	T59	109.591	29.360	80.231	\$1,880	\$7,382	3.93	2.88
2	T60	103.588	31.313	72.275	\$1,309	\$7,873	6.01	1.89
2	63	322.013	97.341	224.672	\$4,194	\$49,984	11.92	0.95
2	73	86.090	39.131	46.959	\$1,036	\$9,841	9.50	1.19
2	86	236.466	96.399	140.067	\$3,050	\$7,977	2.62	4.33
2	92	103.892	62.181	41.711	\$1,160	\$15,747	13.57	0.83
2	482	107.677	74.037	33.640	\$652	\$8,622	13.23	0.86
2	483	134.598	74.037	60.551	\$1,188	\$8,622	7.26	1.57
2	484	107.677	74.037	33.640	\$652	\$8,622	13.23	0.86
2	485	127.868	74.037	53.823	\$1,048	\$8,622	8.22	1.38
2	486	131.831	88.468	43.363	\$837	\$10,241	12.24	0.93
2	487	35.891	24.678	11.213	\$240	\$2,875	11.99	0.95
2	2770	2,786.940	1,150.523	1636.417	\$28,871	\$91,073	3.15	3.61
2	2778	604.306	399.381	204.925	\$3,594	\$31,624	8.80	1.29
2	5232	16.355	11.501	4.854	\$98	\$1,674	17.13	0.66
3.1	86	97.369	46.559	50.810	\$936	\$9,410	10.05	1.13
3.1	94	445.642	177.192	268.450	\$4,806	\$7,192	1.50	7.61
3.1	158	220.964	109.014	111.950	\$2,242	\$4,816	2.06	5.52
3.1	159	820.250	739.330	80.920	\$1,187	\$1,754	1.48	7.74
3.1	2770	1,150.044	630.464	519.580	\$9,312	\$9,410	1.01	11.27
3.1	2730	193.804	135.184	58.620	\$1,050	\$5,295	5.04	2.26
3.1	2778	399.321	218.911	180.410	\$3,229	\$9,410	2.91	3.91
3.1	2942	108.936	79.746	29.190	\$608	\$4,185	6.88	1.65
3.1	2943	108.936	79.746	29.190	\$608	\$4,185	6.88	1.65
3.1	2944	207.968	155.418	52.550	\$1,099	\$7,692	7.00	1.62
3.1	2963	58.140	41.000	17.140	\$356	\$3,077	8.65	1.31
3.1	2969	58.140	41.000	17.140	\$356	\$3,077	8.65	1.31
3.1	2970	58.140	41.000	17.140	\$356	\$3,077	8.65	1.31
3.1	2971	58.140	41.000	17.140	\$356	\$3,077	8.65	1.31
3.1	2972	58.140	41.000	17.140	\$356	\$3,077	8.65	1.31
3.1	2973	58.140	41.000	17.140	\$356	\$3,077	8.65	1.31
3.1	2974	58.140	41.000	17.140	\$356	\$3,077	8.65	1.31
3.1	2979	58.140	41.000	17.140	\$356	\$3,077	8.65	1.31
3.1	2980	58.140	41.000	17.140	\$356	\$3,077	8.65	1.31
3.1	5220	1,016.726	768.826	247.900	\$3,312	\$5,903	1.78	6.44
3.1	5222	331.880	224.670	107.210	\$2,138	\$5,474	2.56	4.44
3.1	5253	248.910	171.280	77.630	\$1,553	\$5,044	3.25	3.50
3.1	5256	1,578.608	1,330.718	247.890	\$3,312	\$5,903	1.78	6.44
4.1	2358	127.745	33.905	93.840	\$837	\$7,385	8.82	1.32
4.1	2388N	154.360	37.970	116.390	\$1,246	\$4,055	3.25	3.55
4.1	2388S	149.040	34.170	114.870	\$1,228	\$3,650	2.97	3.89
4.2	2358	33.915	28.831	5.084	\$37	\$629	16.80	0.70
4.2	2388N	37.980	32.285	5.695	\$42	\$629	15.03	0.78
4.2	2388S	34.181	29.056	5.125	\$37	\$629	16.80	0.70
4.2	4557	148.582	126.302	22.280	\$164	\$629	3.84	3.06
4.2	5913	148.121	125.909	22.212	\$163	\$629	3.86	3.05
4.2	6532	106.342	90.398	15.944	\$117	\$629	5.39	2.18
4.2	6609	274.306	233.174	41.132	\$302	\$629	2.09	5.64
4.2	6647	285.736	242.888	42.848	\$314	\$629	2.00	5.88
TOTALS		14,041.360	8,604.769	5,436.572	\$93,956	\$410,942	4.37	2.61

FORT KNOX LIMITED ENERGY STUDY

SUMMARY OF COST ESTIMATES

ECO NUMBER	BUILDING NUMBER	MATERIAL COSTS (\$)	LABOR COSTS (\$)	ADDITIONAL COSTS (\$)	TOTAL COST ESTIMATE (\$)
2	T58	\$2,968.00	\$1,574.00	\$2,347.00	\$6,889.00
2	T59	\$3,180.00	\$1,686.00	\$2,516.00	\$7,382.00
2	T60	\$3,392.00	\$1,799.00	\$2,682.00	\$7,873.00
2	63	\$28,560.00	\$4,078.00	\$17,346.00	\$49,984.00
2	73	\$4,240.00	\$2,248.00	\$3,353.00	\$9,841.00
2	86	\$4,050.00	\$1,180.00	\$2,747.00	\$7,977.00
2	92	\$8,612.00	\$1,686.00	\$5,449.00	\$15,747.00
2	482	\$4,308.00	\$1,349.00	\$2,965.00	\$8,622.00
2	483	\$4,308.00	\$1,349.00	\$2,965.00	\$8,622.00
2	484	\$4,308.00	\$1,349.00	\$2,965.00	\$8,622.00
2	485	\$4,308.00	\$1,349.00	\$2,965.00	\$8,622.00
2	486	\$5,090.00	\$1,630.00	\$3,521.00	\$10,241.00
2	487	\$1,436.00	\$450.00	\$989.00	\$2,875.00
2	2770	\$47,520.00	\$12,144.00	\$31,409.00	\$91,073.00
2	2778	\$16,500.00	\$4,217.00	\$10,907.00	\$31,624.00
2	5232	\$818.00	\$281.00	\$575.00	\$1,674.00
3.1	86	\$4,931.00	\$1,234.00	\$3,245.00	\$9,410.00
3.1	94	\$3,679.00	\$1,037.00	\$2,476.00	\$7,192.00
3.1	158	\$2,479.00	\$542.00	\$1,595.00	\$4,616.00
3.1	159	\$926.00	\$222.00	\$606.00	\$1,754.00
3.1	2770	\$4,931.00	\$1,234.00	\$3,245.00	\$9,410.00
3.1	2730	\$2,905.00	\$558.00	\$1,832.00	\$5,295.00
3.1	2778	\$4,931.00	\$1,234.00	\$3,245.00	\$9,410.00
3.1	2942	\$2,279.00	\$460.00	\$1,446.00	\$4,185.00
3.1	2943	\$2,279.00	\$460.00	\$1,446.00	\$4,185.00
3.1	2944	\$4,131.00	\$903.00	\$2,658.00	\$7,692.00
3.1	2963	\$1,652.00	\$361.00	\$1,064.00	\$3,077.00
3.1	2969	\$1,652.00	\$361.00	\$1,064.00	\$3,077.00
3.1	2970	\$1,652.00	\$361.00	\$1,064.00	\$3,077.00
3.1	2971	\$1,652.00	\$361.00	\$1,064.00	\$3,077.00
3.1	2972	\$1,652.00	\$361.00	\$1,064.00	\$3,077.00
3.1	2973	\$1,652.00	\$361.00	\$1,064.00	\$3,077.00
3.1	2974	\$1,652.00	\$361.00	\$1,064.00	\$3,077.00
3.1	2979	\$1,652.00	\$361.00	\$1,064.00	\$3,077.00
3.1	2980	\$1,652.00	\$361.00	\$1,064.00	\$3,077.00
3.1	5220	\$3,079.00	\$790.00	\$2,034.00	\$5,903.00
3.1	5222	\$2,879.00	\$707.00	\$1,888.00	\$5,474.00
3.1	5253	\$2,679.00	\$625.00	\$1,740.00	\$5,044.00
3.1	5256	\$3,079.00	\$790.00	\$2,034.00	\$5,903.00
4.1	2358	\$2,940.00	\$1,773.00	\$2,672.00	\$7,385.00
4.1	2388N	\$1,750.00	\$844.00	\$1,461.00	\$4,055.00
4.1	2388S	\$1,575.00	\$760.00	\$1,315.00	\$3,650.00
4.2	2358	\$250.00	\$165.00	\$214.00	\$629.00
4.2	2388N	\$250.00	\$165.00	\$214.00	\$629.00
4.2	2388S	\$250.00	\$165.00	\$214.00	\$629.00
4.2	4557	\$250.00	\$165.00	\$214.00	\$629.00
4.2	5913	\$250.00	\$165.00	\$214.00	\$629.00
4.2	6532	\$250.00	\$165.00	\$214.00	\$629.00
4.2	6609	\$250.00	\$165.00	\$214.00	\$629.00
4.2	6647	\$250.00	\$165.00	\$214.00	\$629.00
TOTALS		\$211,918.00	\$57,111.00	\$141,913.00	\$410,942.00

* INCLUDED SALES TAX, OVERHEAD, PROFIT, BOND, CONTINGENCIES, SIOH & DESIGN.

LIFE CYCLE COST ANALYSIS SUMMARY

STUDY: TOTAL1

LCCID 1.072

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

INSTALLATION & LOCATION: FT KNOX REGION NOS. 4 CENSUS: 3

PROJECT NO. & TITLE: TLT1 ECO 2, 3.1, 4.1, 4.2

FISCAL YEAR 1994 DISCRETE PORTION NAME: LIGHTING

ANALYSIS DATE: 10-14-93 ECONOMIC LIFE 15 YEARS PREPARED BY: JULIE HOLLENS

1. INVESTMENT

A. CONSTRUCTION COST	\$	373580.		
B. SIOH	\$	18681.		
C. DESIGN COST	\$	18681.		
D. TOTAL COST (1A+1B+1C)	\$	410942.		
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$		0.	
F. PUBLIC UTILITY COMPANY REBATE	\$		0.	
G. TOTAL INVESTMENT (1D - 1E - 1F)				\$ 410942.

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1992

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 7.34	5436.	\$ 39900.	11.77	\$ 469626.
B. DIST	\$.00	0.	\$ 0.	13.83	\$ 0.
C. RESID	\$.00	0.	\$ 0.	16.15	\$ 0.
D. NAT G	\$.00	0.	\$ 0.	15.34	\$ 0.
E. COAL	\$.00	0.	\$ 0.	12.82	\$ 0.
F. PPG	\$.00	0.	\$ 0.	11.12	\$ 0.
M. DEMAND SAVINGS			\$ 49501.	11.12	\$ 550451.
N. TOTAL		5436.	\$ 89401.		\$ 1020077.

3. NON ENERGY SAVINGS(+) / COST(-)

A. ANNUAL RECURRING (+/-)		\$ 4555.
(1) DISCOUNT FACTOR (TABLE A)	11.12	
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ 50652.

B. NON RECURRING SAVINGS(+) / COSTS(-)

ITEM	SAVINGS(+) COST(-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS(+)/ COST(-) (4)
d. TOTAL	\$ 0.			0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-) (3A2+3Bd4) \$ 50652.

4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3B1d/(YRS ECONOMIC LIFE)) \$ 93956.

5. SIMPLE PAYBACK PERIOD (1G/4) 4.37 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 1070729.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(5 / 1G)= 2.61
(IF < 1 PROJECT DOES NOT QUALIFY)

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 10.86 %

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: T58
BUILDING FUNCTION: WAREHOUSE

BUILDING USE: _____
HOURS/DAY 9.5
DAYS/WEEK 5

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
0 2 LAMP @ 96 WATTS/FIXT = 0 WATTS
8 4 LAMP @ 192 WATTS/FIXT = 1,536 WATTS
8 FOOT
0 2 LAMP @ 158 WATTS/FIXT = 0 WATTS
INCANDESCENT
36 1 LAMP @ 200 WATTS/FIXT = 7,200 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 1.00
AVERAGE FOOTCANDLES 6.00
TOTAL EXISTING KW 8.7
TOTAL EXISTING KWH 21,578

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/
REFLECTORS 37 WATTS/FIXT = 0 WATTS
56 2 LAMP W/
58 WATTS/FIXT = 3,248 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 300 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.45
AVERAGE FOOTCANDLES 16.00
TOTAL REPLACEMENT KW 3.2
TOTAL REPLACEMENT KWH 8,023

NET ENERGY SAVINGS

46,251 MBTU/YR

NET DOLLAR SAVINGS

\$805.08

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 08:26:29

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING T58

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

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Release 4.20

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT58E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T58

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Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T58

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DETAILED ESTIMATE

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTY	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	53.00	2.65	83.88
WC=1100	56.00 EA EELEF			52	1,574	7	2,968	148	4,697
TOTAL DIVISION 16 ELECTRICAL				52	1,574	7	2,968	148	4,697
TOTAL FACILITY AA. ELECTRICAL				52	1,574	7	2,968	148	4,697
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				52	1,574	7	2,968	148	4,697
TOTAL BASE BID				52	1,574	7	2,968	148	4,697
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				52	1,574	7	2,968	148	4,697

*** END OF DETAIL REPORT ***

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT58E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T58

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PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT58E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T58

TIME 08:26:29

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	4,697	10.0% 470	0.0% 0	7.5% 388	2.5% 139	0.0% 0	5,693	5693.48
<hr/>										
BID ITEM TOTAL		1.00 EA	4,697	470	0	388	139	0	5,693	5693.48
<hr/>										
TOTAL BASE BID			4,697	470	0	388	139	0	5,693	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
<hr/>										
TOTAL INCL ADD			4,697	470	0	388	139	0	5,693	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT58E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING T58

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PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID BID ITEM	QUANTITY UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 EA	5,694		5,694	5693.50
TOTAL CURRENT CONTRACT COST		5,694	0	5,694	
Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%	0	0	0	
ESCALATED CONTRACT COST		5,694	0	5,694	
Government-Furnished Property		0		0	
SUBTOTAL		5,694	0	5,694	
Contingencies	10.0%	569	0	569	
SUBTOTAL		6,263	0	6,263	
SIOH (S&A)	5.0%	313	0	313	
CURRENT WORKING ESTIMATE		6,576	0	6,576	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT58E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T58

TIME 08:26:29

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT	W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	52	1,574	7	3,116		4,697	100.0%	0	4,697
	TOTAL DIRECT				52	1,574	7	3,116		4,697	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT58E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T58

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CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

ID	CONTRACTOR	PM	SUBTOTAL	*** OVERHEAD *** AMOUNT	PCT	HOFC%	**** PROFIT **** AMOUNT	PCT	BOND%	OTHR%	***** TOTAL CONTRACT ***** AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		4,697	470	10.0%	0.0	388	7.5%	2.5%	0.0%	5,693	100.0%	5693.48
	TOTAL OVERHEAD & PROFIT			470	10.0%		388	7.5%					

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT58E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T58

TIME 08:26:29

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	52	1,574	7	2,968	148	4,697
TOTAL DIRECT	52	1,574	7	2,968	148	4,697

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT58E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T58

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SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	52	1,574	7	2,968	148	4,697
TOTAL DIRECT	52	1,574	7	2,968	148	4,697

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT58E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T58

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EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE *** ADJ FACTOR ADJUSTD BOOK OP -- HRLY --- UPB **** TOTAL ****												
EQUIP DESCRIPTION	LIFE HRS	TL	HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST
EMI20 SMALL TOOLS									1.40	1.40	5	7
TOTAL PROJECT EQUIPMENT HOURS											5	7

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T58

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LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	52	1,574
TOTAL PROJECT MANHOURS								52	1,574

* * * END OF SUMMARY REPORT * * *

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: T59
BUILDING FUNCTION: SMALL PARTS WAREHOUSE

BUILDING USE:
HOURS/DAY 9.5
DAYS/WEEK 5

ELECTRIC COSTS:

ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
0 2 LAMP @ 96 WATTS/FIXT = 0 WATTS
0 4 LAMP @ 192 WATTS/FIXT = 0 WATTS
8 FOOT
0 2 LAMP @ 158 WATTS/FIXT = 0 WATTS
INCANDESCENT
65 1 LAMP @ 200 WATTS/FIXT = 13,000 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 1.31
AVERAGE FOOTCANDLES 7.50
TOTAL EXISTING KW 13.0
TOTAL EXISTING KWH 32,110

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/ REFLECTORS 37 WATTS/FIXT = 0 WATTS
60 2 LAMP W/ 58 WATTS/FIXT = 3,480 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 300 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.43
AVERAGE FOOTCANDLES 15.00
TOTAL REPLACEMENT KW 3.5
TOTAL REPLACEMENT KWH 8,596

NET ENERGY SAVINGS

80.231 MBTU/YR

NET DOLLAR SAVINGS

\$1,396.57

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 08:33:33

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING T59

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT59E2

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Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
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U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T59

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DETAILED ESTIMATE

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP	***	UNIT COSTS: ***		0.93	28.11	0.13	53.00	2.65	83.88
WC=1100	60.00	EA EELEF		56	1,686	8	3,180	159	5,033
TOTAL DIVISION 16 ELECTRICAL				56	1,686	8	3,180	159	5,033
TOTAL FACILITY AA. ELECTRICAL				56	1,686	8	3,180	159	5,033
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				56	1,686	8	3,180	159	5,033
TOTAL BASE BID				56	1,686	8	3,180	159	5,033
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				56	1,686	8	3,180	159	5,033

*** END OF DETAIL REPORT ***

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT59E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T59

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PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT59E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING T59

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BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY	COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	5,033	10.0% 503	0.0% 0	7.5% 415	2.5% 149	0.0% 0	6,100 6100.17
BID ITEM TOTAL		1.00 EA	5,033	503	0	415	149	0	6,100 6100.17
TOTAL BASE BID			5,033	503	0	415	149	0	6,100
TOTAL ADDITIVE			0	0	0	0	0	0	0
TOTAL INCL ADD			5,033	503	0	415	149	0	6,100

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT59E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T59

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PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00	EA	6,100		6,100	6100.20
TOTAL CURRENT CONTRACT COST				6,100	0	6,100	
Cost Growth from 09/93 to 09/94 Index Values: 0000 0000		0.0%		0	0	0	
ESCALATED CONTRACT COST				6,100	0	6,100	
Government-Furnished Property				0		0	
SUBTOTAL				6,100	0	6,100	
Contingencies		10.0%		610	0	610	
SUBTOTAL				6,710	0	6,710	
SIOH (S&A)		5.0%		336	0	336	
CURRENT WORKING ESTIMATE				7,046	0	7,046	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT59E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T59

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CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT	W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	56	1,686	8	3,339		5,033	100.0%	0	5,033
	TOTAL DIRECT				56	1,686	8	3,339		5,033	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT59E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T59

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CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

-----			*** OVERHEAD ***			-----			**** PROFIT ****			-----			***** TOTAL CONTRACT *****		
ID	CONTRACTOR	PM	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT	COST			
AA	GENERAL/PRIME		5,033	503	10.0%	0.0	415	7.5%	2.5%	0.0%	6,100	100.0%	6100.16				
				-----			-----										
			TOTAL OVERHEAD & PROFIT	503	10.0%		415	7.5%									

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT59E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T59

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CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	56	1,686	8	3,180	159	5,033
TOTAL DIRECT	56	1,686	8	3,180	159	5,033

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0T59E2

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Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T59

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SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	56	1,686	8	3,180	159	5,033
TOTAL DIRECT	56	1,686	8	3,180	159	5,033

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT59E2

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Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T59

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EQUIPMENT SUMMARY

SUMMARY PAGE 8

EQUIP	DESCRIPTION	LIFE	HRS	TL	HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	HRLY	UPB	HOURS	TOTAL	COST
EMI20	SMALL TOOLS										1.40	1.40	5		8
													5	8	
TOTAL PROJECT EQUIPMENT HOURS															

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T59

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LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	56	1,686
TOTAL PROJECT MANHOURS								56	1,686

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT59E2

3-58

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: T60
BUILDING FUNCTION: WAREHOUSE

BUILDING USE:

HOURS/DAY 9.5
DAYS/WEEK 5

ELECTRIC COSTS:

ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
0 2 LAMP @ 96 WATTS/FIXT = 0 WATTS
64 4 LAMP @ 192 WATTS/FIXT = 12,288 WATTS
8 FOOT
0 2 LAMP @ 158 WATTS/FIXT = 0 WATTS
INCANDESCENT
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT
AVERAGE FOOTCANDLES

1.23
20.00

TOTAL EXISTING KW
TOTAL EXISTING KWH

12.3
30,351

NET ENERGY SAVINGS

72,275 MBTU/YR

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/
REFLECTORS 37 WATTS/FIXT = 0 WATTS
64 2 LAMP W/
58 WATTS/FIXT = 3,712 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 300 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT
AVERAGE FOOTCANDLES

0.46
20.00

TOTAL REPLACEMENT KW
TOTAL REPLACEMENT KWH

3.7
9,169

NET DOLLAR SAVINGS

\$1,258.08

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 08:41:10

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING T60

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT60E2

3-60

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T60

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U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T60

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DETAILED ESTIMATE

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP	***	UNIT COSTS: ***		0.93	28.11	0.13	53.00	2.65	83.88
WC=1100	64.00	EA	EELEF	60	1,799	8	3,392	170	5,368
TOTAL DIVISION 16 ELECTRICAL				60	1,799	8	3,392	170	5,368
TOTAL FACILITY AA. ELECTRICAL				60	1,799	8	3,392	170	5,368
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				60	1,799	8	3,392	170	5,368
TOTAL BASE BID				60	1,799	8	3,392	170	5,368
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				60	1,799	8	3,392	170	5,368

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT60E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T60

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PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT60E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T60

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BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHER FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	5,368	10.0% 537	0.0% 0	7.5% 443	2.5% 159	0.0% 0	6,507	6506.84
BID ITEM TOTAL		1.00 EA	5,368	537	0	443	159	0	6,507	6506.84
TOTAL BASE BID			5,368	537	0	443	159	0	6,507	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
TOTAL INCL ADD			5,368	537	0	443	159	0	6,507	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT60E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T60

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PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00	EA	6,507		6,507	6506.80
TOTAL CURRENT CONTRACT COST				6,507	0	6,507	
Cost Growth from 09/93 to 09/94 Index Values: 0000 0000		0.0%		0	0	0	
ESCALATED CONTRACT COST				6,507	0	6,507	
Government-Furnished Property				0		0	
SUBTOTAL				6,507	0	6,507	
Contingencies		10.0%		651	0	651	
SUBTOTAL				7,157	0	7,157	
SIOH (S&A)		5.0%		358	0	358	
CURRENT WORKING ESTIMATE				7,515	0	7,515	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT60E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T60

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CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT	W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	60	1,799	8	3,562		5,368	100.0%	0	5,368
	TOTAL DIRECT				60	1,799	8	3,562		5,368	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT60E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T60

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CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

ID	CONTRACTOR	PH	SUBTOTAL	*** OVERHEAD ***	AMOUNT	PCT	HOFC%	**** PROFIT ****	AMOUNT	PCT	BOND%	OTHER%	***** TOTAL CONTRACT *****	AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		5,368	537	10.0%	0.0		443	7.5%	2.5%	0.0%		6,507	100.0%		6506.84
	TOTAL OVERHEAD & PROFIT			537	10.0%			443	7.5%							

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT60E2

3-67

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T60

TIME 08:41:10

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	60	1,799	8	3,392	170	5,368
TOTAL DIRECT	60	1,799	8	3,392	170	5,368

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT60E2

3-68

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T60

TIME 08:41:10

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	60	1,799	8	3,392	170	5,368
TOTAL DIRECT	60	1,799	8	3,392	170	5,368

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT60E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T60

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EQUIPMENT SUMMARY

SUMMARY PAGE 8

EQUIP DESCRIPTION	LIFE HRS	TL HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	HRLY RATE	UPB RATE	HOURS	TOTAL COST
EMI20 SMALL TOOLS								1.40	1.40	6	8
TOTAL PROJECT EQUIPMENT HOURS										6	8

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING T60

TIME 08:41:10

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTH	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	60	1,799
TOTAL PROJECT MANHOURS								60	1,799

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: OT60E2
3-71

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: 63
BUILDING FUNCTION: ADMINISTRATIVE

BUILDING USE:
HOURS/DAY 9
DAYS/WEEK 5

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
0 2 LAMP @ 96 WATTS/FIXT = 0 WATTS
210 4 LAMP @ 192 WATTS/FIXT = 40,320 WATTS
8 FOOT
0 2 LAMP @ 158 WATTS/FIXT = 0 WATTS
INCANDESCENT
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 1.72
AVERAGE FOOTCANDLES 50.00
TOTAL EXISTING KW 40.3
TOTAL EXISTING KWH 94,349

NET ENERGY SAVINGS 224,672 MBTU/YR

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/ REFLECTORS 37 WATTS/FIXT = 0 WATTS
210 2 LAMP W/ REFLECTORS 58 WATTS/FIXT = 12,180 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 300 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.64
AVERAGE FOOTCANDLES 50.00
TOTAL REPLACEMENT KW 12.2
TOTAL REPLACEMENT KWH 28,501

NET DOLLAR SAVINGS \$4,036.41

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 07:50:41

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING 63

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93

Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0063E2

3-73

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
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U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 63

TIME 07:50:41

DETAILED ESTIMATE

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL		QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING										
16512 7000 FLUORESCENT - RECESSED T8 ELECTRONIC BALLAST										
CD=3 EL 7003	4 FT 2 LAMP PARABOLIC LOUVRE W/	*** UNIT COSTS: ***		0.59		19.42	0.08	136.00	6.80	162.29
WC=1100	REFLECTOR	210.00 EA EELEB		124		4,078	16	28,560	1,428	34,082
TOTAL DIVISION 16 ELECTRICAL				124		4,078	16	28,560	1,428	34,082
TOTAL FACILITY AA. ELECTRICAL				124		4,078	16	28,560	1,428	34,082
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				124		4,078	16	28,560	1,428	34,082
TOTAL BASE BID				124		4,078	16	28,560	1,428	34,082
TOTAL ADDITIVE				0		0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				124		4,078	16	28,560	1,428	34,082

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0063E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 63

TIME 07:50:41

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0063E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 63

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BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	34,082	10.0% 3,408	0.0% 0	7.5% 2,812	2.5% 1,008	0.0% 0	41,309	41309.08
BID ITEM TOTAL		1.00 EA	34,082	3,408	0	2,812	1,008	0	41,309	41309.08
TOTAL BASE BID			34,082	3,408	0	2,812	1,008	0	41,309	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
TOTAL INCL ADD			34,082	3,408	0	2,812	1,008	0	41,309	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0063E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 63

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PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00 EA	41,309		41,309	41309.10
	TOTAL CURRENT CONTRACT COST		41,309	0	41,309	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%	0	0	0	
	ESCALATED CONTRACT COST		41,309	0	41,309	
	Government-Furnished Property		0		0	
	SUBTOTAL		41,309	0	41,309	
	Contingencies	10.0%	4,131	0	4,131	
	SUBTOTAL		45,440	0	45,440	
	SIOH (S&A)	5.0%	2,272	0	2,272	
	CURRENT WORKING ESTIMATE		47,712	0	47,712	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0063E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 63

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CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT	W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	124	4,078	16	29,988		34,082	100.0%	0	34,082
	TOTAL DIRECT				124	4,078	16	29,988		34,082	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0063E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 63

TIME 07:50:41

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

		*** OVERHEAD ***				**** PROFIT ****				***** TOTAL CONTRACT *****			
ID	CONTRACTOR	PH	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		34,082	3,408	10.0%	0.0	2,812	7.5%	2.5%	0.0%	41,309	100.0%	41309.08
				-----			-----						
				3,408	10.0%		2,812	7.5%					
			TOTAL OVERHEAD & PROFIT										

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0063E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 63

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CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	124	4,078	16	28,560	1,428	34,082
TOTAL DIRECT	124	4,078	16	28,560	1,428	34,082

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0063E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
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SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	124	4,078	16	28,560	1,428	34,082
TOTAL DIRECT	124	4,078	16	28,560	1,428	34,082

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0063E2

EQUIPMENT SUMMARY

SUMMARY PAGE 8

EQUIP	DESCRIPTION	LIFE HRS	*** BOOK VALUE *** TL HRLY OWNRSH	ADJ FACTOR OWNS OVTH	ADJUSTD OWNRSH	BOOK OP -- EXPENSE	-- HRLY RATE	--- UPB RATE	**** TOTAL **** HOURS	**** COST
EMI20	SMALL TOOLS						1.40	1.40	11	16
TOTAL PROJECT EQUIPMENT HOURS									11	16

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 63

TIME 07:50:41

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	124	4,078
TOTAL PROJECT MANHOURS								124	4,078

*** END OF SUMMARY REPORT ***

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0063E2

3-84

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: 73
BUILDING FUNCTION: MACHINE SHOP

BUILDING USE:
HOURS/DAY 9.5
DAYS/WEEK 5

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
0 2 LAMP @ 96 WATTS/FIXT = 0 WATTS
41 4 LAMP @ 192 WATTS/FIXT = 7,872 WATTS
8 FOOT
0 2 LAMP @ 158 WATTS/FIXT = 0 WATTS
INCANDESCENT
26 1 LAMP @ 90 WATTS/FIXT = 2,340 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.98
AVERAGE FOOTCANDLES 22.00

TOTAL EXISTING KW 10.2
TOTAL EXISTING KWH 25,224

NET ENERGY SAVINGS

46,959 MBTU/YR

\$817.40

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/
REFLECTORS 37 WATTS/FIXT = 0 WATTS
80 2 LAMP W/
58 WATTS/FIXT = 4,640 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 300 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.54
AVERAGE FOOTCANDLES 30.00

TOTAL REPLACEMENT KW 4.6
TOTAL REPLACEMENT KWH 11,461

NET DOLLAR SAVINGS

\$817.40

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 08:01:43

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING 73

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0073E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
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Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 73
 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 08:01:43

DETAILED ESTIMATE

DETAIL PAGE 1

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP				0.93	28.11	0.13	53.00	2.65	83.88
WC=1100				75	2,248	10	4,240	212	6,711
TOTAL DIVISION 16 ELECTRICAL				75	2,248	10	4,240	212	6,711
TOTAL FACILITY AA. ELECTRICAL				75	2,248	10	4,240	212	6,711
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				75	2,248	10	4,240	212	6,711
TOTAL BASE BID				75	2,248	10	4,240	212	6,711
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				75	2,248	10	4,240	212	6,711

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0073E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 73

TIME 08:01:43

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0073E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 73

TIME 08:01:43

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHER FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL									
		1.00 EA	6,711	10.0% 671	0.0% 0	7.5% 554	2.5% 198	0.0% 0	8,134	8133.55
BID ITEM TOTAL		1.00 EA	6,711	671	0	554	198	0	8,134	8133.55
TOTAL BASE BID			6,711	671	0	554	198	0	8,134	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
TOTAL INCL ADD			6,711	671	0	554	198	0	8,134	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0073E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 73

TIME 08:01:43

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
	1. BUILDING TO THE 5 FOOT LINE	1.00	EA	8,134		8,134	8133.50
	TOTAL CURRENT CONTRACT COST			8,134	0	8,134	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%		0	0	0	
	ESCALATED CONTRACT COST			8,134	0	8,134	
	Government-Furnished Property			0		0	
	SUBTOTAL			8,134	0	8,134	
	Contingencies	10.0%		813	0	813	
	SUBTOTAL			8,947	0	8,947	
	SIOH (S&A)	5.0%		447	0	447	
	CURRENT WORKING ESTIMATE			9,394	0	9,394	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0073E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 73

TIME 08:01:43

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	75	2,248	10	4,452	6,711	100.0%	0	6,711
	TOTAL DIRECT				75	2,248	10	4,452	6,711	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0073E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 73

TIME 08:01:43

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

-----			*** OVERHEAD ***			-----			**** PROFIT ****			-----			***** TOTAL CONTRACT *****		
ID	CONTRACTOR	PM	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT	COST			
AA	GENERAL/PRIME		6,711	671	10.0%	0.0	554	7.5%	2.5%	0.0%	8,134	100.0%	8133.55				
				-----			-----										
				671	10.0%		554	7.5%									
			TOTAL OVERHEAD & PROFIT														

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0073E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 73

TIME 08:01:43

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	75	2,248	10	4,240	212	6,711
TOTAL DIRECT	75	2,248	10	4,240	212	6,711

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0073E2

3-94

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 73

TIME 08:01:43

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	75	2,248	10	4,240	212	6,711
TOTAL DIRECT	75	2,248	10	4,240	212	6,711

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0073E2

3-95

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 73

TIME 08:01:43

EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE *** ADJ FACTOR ADJUSTD BOOK OP -- HRLY --- UPB **** TOTAL ****														
EQUIP DESCRIPTION	LIFE HRS	TL	HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST		

EMI20 SMALL TOOLS									1.40	1.40	7	10		
											-----	-----		
TOTAL PROJECT EQUIPMENT HOURS													7	10

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0073E2

3-96

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 73

TIME 08:01:43

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	75	2,248
TOTAL PROJECT MANHOURS								75	2,248

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0073E2

3-97

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: 86
BUILDING FUNCTION: WAREHOUSE

BUILDING USE:

HOURS/DAY 9.5
DAYS/WEEK 5

ELECTRIC COSTS:

ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
0 2 LAMP @ 96 WATTS/FIXT = 0 WATTS
0 4 LAMP @ 192 WATTS/FIXT = 0 WATTS
8 FOOT
0 2 LAMP @ 158 WATTS/FIXT = 0 WATTS
INCANDESCENT
13 1 LAMP @ 750 WATTS/FIXT = 9,750 WATTS
61 1 LAMP @ 300 WATTS/FIXT = 18,300 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT
AVERAGE FOOTCANDLES

1.29

TOTAL EXISTING KW 28.1
TOTAL EXISTING KWH 69,284

NET ENERGY SAVINGS

140.067 MBTU/YR

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/
REFLECTORS 37 WATTS/FIXT = 0 WATTS
0 2 LAMP W/
REFLECTORS 58 WATTS/FIXT = 0 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
36 FIXTURES @ 240 WATTS/FIXT = 8,640 WATTS
6 FIXTURES @ 465 WATTS/FIXT = 2,790 WATTS

AVERAGE WATTS/SQ FT
AVERAGE FOOTCANDLES

0.53
21.00

TOTAL REPLACEMENT KW 11.4
TOTAL REPLACEMENT KWH 28,232

NET DOLLAR SAVINGS

\$2,438.12

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 08:10:13

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING 86

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93

Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0086E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS H-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 86

TIME 08:10:13

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DETAILED ESTIMATE

DETAIL PAGE

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Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 86

TIME 08:10:13

DETAILED ESTIMATE

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING									
16512 9000 HIGH INTENSITY DISCHARGE									
CD=3 EL 9003 200 W HPS FIXTURE AND LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	95.00	4.75	127.98
WC=1100	36.00 EA EELEF			34	1,012	5	3,420	171	4,607
CD=3 EL 9004 400 W HPS FIXTURE AND LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	105.00	5.25	138.48
WC=1100	6.00 EA EELEF			6	169	1	630	32	831
TOTAL DIVISION 16 ELECTRICAL				39	1,180	5	4,050	203	5,438
TOTAL FACILITY AA. ELECTRICAL				39	1,180	5	4,050	203	5,438
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				39	1,180	5	4,050	203	5,438
TOTAL BASE BID				39	1,180	5	4,050	203	5,438
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				39	1,180	5	4,050	203	5,438

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0086E2

3-101

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 86

TIME 08:10:13

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0086E2

3-102

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 86

TIME 08:10:13

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHER FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	5,438	10.0% 544	0.0% 0	7.5% 449	2.5% 161	0.0% 0	6,591	6591.46
BID ITEM TOTAL		1.00 EA	5,438	544	0	449	161	0	6,591	6591.46
TOTAL BASE BID			5,438	544	0	449	161	0	6,591	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
TOTAL INCL ADD			5,438	544	0	449	161	0	6,591	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0086E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 86

TIME 08:10:13

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00 EA	6,592		6,592	6591.50
	TOTAL CURRENT CONTRACT COST		6,592	0	6,592	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%	0	0	0	
	ESCALATED CONTRACT COST		6,592	0	6,592	
	Government-Furnished Property		0		0	
	SUBTOTAL		6,592	0	6,592	
	Contingencies	10.0%	659	0	659	
	SUBTOTAL		7,251	0	7,251	
	SIOH (S&A)	5.0%	363	0	363	
	CURRENT WORKING ESTIMATE		7,613	0	7,613	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0086E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 86

TIME 08:10:13

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	39	1,180	5	4,253	5,438	100.0%	0	5,438
	TOTAL DIRECT				39	1,180	5	4,253	5,438	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0086E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 86

TIME 08:10:13

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

ID	CONTRACTOR	PM	SUBTOTAL	*** OVERHEAD *** AMOUNT	PCT	HOFC%	**** PROFIT **** AMOUNT	PCT	BOND%	OTHR%	***** TOTAL CONTRACT ***** AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		5,438	544	10.0%	0.0	449	7.5%	2.5%	0.0%	6,591	100.0%	6591.45
	TOTAL OVERHEAD & PROFIT			544	10.0%		449	7.5%					

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0086E2

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 86

TIME 08:10:13

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	39	1,180	5	4,050	203	5,438
TOTAL DIRECT	39	1,180	5	4,050	203	5,438

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0086E2

3-107

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 86

TIME 08:10:13

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	39	1,180	5	4,050	203	5,438
TOTAL DIRECT	39	1,180	5	4,050	203	5,438

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0086E2

3-108

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 86

TIME 08:10:13

EQUIPMENT SUMMARY

SUMMARY PAGE 8

-----		*** BOOK VALUE ***	ADJ FACTOR	ADJUSTD	BOOK OP	--	HRLY	---	UPB	****	TOTAL	****	
EQUIP	DESCRIPTION	LIFE HRS	TL	HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST

EMI20	SMALL TOOLS									1.40	1.40	4	5

TOTAL PROJECT EQUIPMENT HOURS												4	5

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0086E2

3-109

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 86

TIME 08:10:13

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	39	1,180
TOTAL PROJECT MANHOURS								39	1,180

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0086E2

3-110

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: 92
BUILDING FUNCTION: WAREHOUSE

BUILDING USE:
HOURS/DAY 10.5
DAYS/WEEK 5

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
50 2 LAMP @ 96 WATTS/FIXT = 4,800 WATTS
0 4 LAMP @ 192 WATTS/FIXT = 0 WATTS
8 FOOT
0 2 LAMP @ 158 WATTS/FIXT = 0 WATTS
INCANDESCENT
7 1 LAMP @ 150 WATTS/FIXT = 1,050 WATTS
53 1 LAMP @ 100 WATTS/FIXT = 5,300 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS
AVERAGE WATTS/SQ FT 1.03
AVERAGE FOOTCANDLES 10.00
TOTAL EXISTING KW 11.2
TOTAL EXISTING KWH 30,440

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/ REFLECTORS 37 WATTS/FIXT = 0 WATTS
4 2 LAMP W/ 58 WATTS/FIXT = 232 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
56 FIXTURES @ 115 WATTS/FIXT = 6,440 WATTS
0 FIXTURES @ 300 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS
AVERAGE WATTS/SQ FT 0.60
AVERAGE FOOTCANDLES 18.00
TOTAL REPLACEMENT KW 6.7
TOTAL REPLACEMENT KWH 18,215

NET ENERGY SAVINGS

41.711 MBTU/YR

NET DOLLAR SAVINGS

\$686.09

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 08:18:25

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING 92

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93

Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0092E2

3-112

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
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DETAILED ESTIMATE	DETAIL PAGE
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Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 92
 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 08:18:25

DETAILED ESTIMATE

DETAIL PAGE 1

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	53.00	2.65	83.88
WC=1100	4.00 EA EELEF		4		112	1	212	11	336
16512 9000 HIGH INTENSITY DISCHARGE									
CD=3 EL 9002 100 W HPS FIXTURE AND LAMP FOR	*** UNIT COSTS: ***			0.93	28.11	0.13	150.00	7.50	185.73
WC=1100 LOW BAY W/ 13' HEIGHT	56.00 EA EELEF		52		1,574	7	8,400	420	10,401
TOTAL DIVISION 16 ELECTRICAL				56	1,686	8	8,612	431	10,736
TOTAL FACILITY AA. ELECTRICAL				56	1,686	8	8,612	431	10,736
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				56	1,686	8	8,612	431	10,736
TOTAL BASE BID				56	1,686	8	8,612	431	10,736
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				56	1,686	8	8,612	431	10,736

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0092E2

3-114

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 92

TIME 08:18:25

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0092E2

3-115

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 92

TIME 08:18:25

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	10,736	10.0% 1,074	0.0% 0	7.5% 886	2.5% 317	0.0% 0	13,013	13013.28
<hr/>										
BID ITEM TOTAL		1.00 EA	10,736	1,074	0	886	317	0	13,013	13013.28
<hr/>										
TOTAL BASE BID			10,736	1,074	0	886	317	0	13,013	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
<hr/>										
TOTAL INCL ADD			10,736	1,074	0	886	317	0	13,013	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0092E2

3-116

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 92

TIME 08:18:25

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
	1. BUILDING TO THE 5 FOOT LINE	1.00	EA	13,013		13,013	13013.30
	TOTAL CURRENT CONTRACT COST			13,013	0	13,013	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%		0	0	0	
	ESCALATED CONTRACT COST			13,013	0	13,013	
	Government-Furnished Property			0		0	
	SUBTOTAL			13,013	0	13,013	
	Contingencies	10.0%		1,301	0	1,301	
	SUBTOTAL			14,315	0	14,315	
	SIOH (S&A)	5.0%		716	0	716	
	CURRENT WORKING ESTIMATE			15,030	0	15,030	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0092E2

3-117

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 92

TIME 08:18:25

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT	W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	56	1,686	8	9,043		10,736	100.0%	0	10,736
	TOTAL DIRECT				56	1,686	8	9,043		10,736	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0092E2

3-118

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 92

TIME 08:18:25

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

-----			*** OVERHEAD ***			-----			**** PROFIT ****			-----			***** TOTAL CONTRACT *****		
ID	CONTRACTOR	PM	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT	COST			
AA	GENERAL/PRIME		10,736	1,074	10.0%	0.0	886	7.5%	2.5%	0.0%	13,013	100.0%	13013.28				
				-----			-----										
				1,074	10.0%		886	7.5%									

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0092E2

3-119

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 92

TIME 08:18:25

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	56	1,686	8	8,612	431	10,736
TOTAL DIRECT	56	1,686	8	8,612	431	10,736

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0092E2

3-120

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 92

TIME 08:18:25

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	56	1,686	8	8,612	431	10,736
TOTAL DIRECT	56	1,686	8	8,612	431	10,736

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0092E2

3-121

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 92

TIME 08:18:25

EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE ***		ADJ FACTOR		ADJUSTD		BOOK OP --		HRLY	---	UPB	****	TOTAL	****
EQUIP	DESCRIPTION	LIFE HRS	TL	HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST
EMI20	SMALL TOOLS									1.40	1.40	5	8
												5	8
TOTAL PROJECT EQUIPMENT HOURS													

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0092E2

3-122

Wed 15 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 92

TIME 08:18:25

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	56	1,686
TOTAL PROJECT MANHOURS								56	1,686

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0092E2

3-123

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: 482

BUILDING FUNCTION: MOTOR POOL/VEHICLE MAINTENANCE

BUILDING USE:

HOURS/DAY 8
DAYS/WEEK 5

ELECTRIC COSTS:

ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
0 2 LAMP @ 96 WATTS/FIXT = 0 WATTS
0 4 LAMP @ 192 WATTS/FIXT = 0 WATTS
8 FOOT
96 2 LAMP @ 158 WATTS/FIXT = 15,168 WATTS
INCANDESCENT
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 1.40
AVERAGE FOOTCANDLES 20.00

TOTAL EXISTING KW 15.2
TOTAL EXISTING KWH 31,549

NET ENERGY SAVINGS

33,640 MBTU/YR

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/ REFLECTORS 37 WATTS/FIXT = 0 WATTS
6 2 LAMP W/ 58 WATTS/FIXT = 348 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
42 FIXTURES @ 240 WATTS/FIXT = 10,080 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.93
AVERAGE FOOTCANDLES 30.00

TOTAL REPLACEMENT KW 10.4
TOTAL REPLACEMENT KWH 21,690

NET DOLLAR SAVINGS \$649.02

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 15:00:07

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING 482

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93

Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0482E2

3-125

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 482

TIME 15:00:07

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DETAILED ESTIMATE

DETAIL PAGE

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Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 482

TIME 15:00:07

DETAILED ESTIMATE

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP WC=1100	*** UNIT COSTS: *** 6.00 EA EELEF			0.93 6	28.11 169	0.13 1	53.00 318	2.65 16	83.88 503
16512 9000 HIGH INTENSITY DISCHARGE									
CD=3 EL 9003 200 W HPS FIXTURE AND LAMP WC=1100	*** UNIT COSTS: *** 42.00 EA EELEF			0.93 39	28.11 1,180	0.13 5	95.00 3,990	4.75 200	127.98 5,375
TOTAL DIVISION 16 ELECTRICAL				45	1,349	6	4,308	215	5,879
TOTAL FACILITY AA. ELECTRICAL				45	1,349	6	4,308	215	5,879
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				45	1,349	6	4,308	215	5,879
TOTAL BASE BID				45	1,349	6	4,308	215	5,879
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				45	1,349	6	4,308	215	5,879

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0482E2

3-127

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 482

TIME 15:00:07

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0482E2

3-128

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 482

TIME 15:00:07

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHER FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	5,879	10.0% 588	0.0% 0	7.5% 485	2.5% 174	0.0% 0	7,125	7125.11
BID ITEM TOTAL		1.00 EA	5,879	588	0	485	174	0	7,125	7125.11
TOTAL BASE BID			5,879	588	0	485	174	0	7,125	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
TOTAL INCL ADD			5,879	588	0	485	174	0	7,125	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0482E2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 482

TIME 15:00:07

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00 EA	7,125		7,125	7125.10
	TOTAL CURRENT CONTRACT COST		7,125	0	7,125	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%	0	0	0	
	ESCALATED CONTRACT COST		7,125	0	7,125	
	Government-Furnished Property		0		0	
	SUBTOTAL		7,125	0	7,125	
	Contingencies	10.0%	713	0	713	
	SUBTOTAL		7,838	0	7,838	
	SIOH (S&A)	5.0%	392	0	392	
	CURRENT WORKING ESTIMATE		8,229	0	8,229	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0482E2

3-130

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 482

TIME 15:00:07

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT W/TX	** TOTAL DIRECT * AMOUNT PCT	* SUBCON * W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	45	1,349	6	4,523	5,879 100.0%	0	5,879
	TOTAL DIRECT				45	1,349	6	4,523	5,879 100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0482E2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 482

TIME 15:00:07

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

ID	CONTRACTOR	PM	SUBTOTAL	*** OVERHEAD *** AMOUNT	PCT	HOFC%	**** PROFIT **** AMOUNT	PCT	BOND%	OTHR%	***** TOTAL CONTRACT ***** AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		5,879	588	10.0%	0.0	485	7.5%	2.5%	0.0%	7,125	100.0%	7125.11
	TOTAL OVERHEAD & PROFIT			588	10.0%		485	7.5%					

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0482E2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 482

TIME 15:00:07

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	45	1,349	6	4,308	215	5,879
TOTAL DIRECT	45	1,349	6	4,308	215	5,879

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0482E2

3-133

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 482

TIME 15:00:07

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	45	1,349	6	4,308	215	5,879
TOTAL DIRECT	45	1,349	6	4,308	215	5,879

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0482E2

3-134

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 482

TIME 15:00:07

EQUIPMENT SUMMARY

SUMMARY PAGE 8

EQUIP DESCRIPTION	LIFE HRS	TL	HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	HRLY	UPB	HOURS	TOTAL	COST
EMI20 SMALL TOOLS									1.40	1.40	4	6	
TOTAL PROJECT EQUIPMENT HOURS											4	6	

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS H-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 482

TIME 15:00:07

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	45	1,349
TOTAL PROJECT MANHOURS								45	1,349

*** END OF SUMMARY REPORT ***

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: 483
BUILDING FUNCTION: MOTOR POOL/VEHICLE MAINTENANCE

BUILDING USE:
HOURS/DAY 8
DAYS/WEEK 5

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
0 2 LAMP @ 96 WATTS/FIXT = 0 WATTS
0 4 LAMP @ 192 WATTS/FIXT = 0 WATTS
8 FOOT
120 2 LAMP @ 158 WATTS/FIXT = 18,960 WATTS
INCANDESCENT
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT
AVERAGE FOOTCANDLES
TOTAL EXISTING KW
TOTAL EXISTING KWH

1.76
25.00
19.0
39,437

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/ REFLECTORS
6 2 LAMP W/ 58 WATTS/FIXT = 348 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
42 FIXTURES @ 240 WATTS/FIXT = 10,080 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT
AVERAGE FOOTCANDLES
TOTAL REPLACEMENT KW
TOTAL REPLACEMENT KWH

0.93
30.00
10.4
21,690

NET ENERGY SAVINGS

60,551 MBTU/YR

NET DOLLAR SAVINGS

\$1,168.24

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 15:10:53

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING 483

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93

Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0483E2

3-138

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 483

TIME 15:10:53

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DETAILED ESTIMATE	DETAIL PAGE
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Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 483
 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 15:10:53

DETAILED ESTIMATE

DETAIL PAGE 1

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP WC=1100	*** UNIT COSTS: *** 6.00 EA EELEF			0.93 6	28.11 169	0.13 1	53.00 318	2.65 16	83.88 503
16512 9000 HIGH INTENSITY DISCHARGE									
CD=3 EL 9003 200 W HPS FIXTURE AND LAMP WC=1100	*** UNIT COSTS: *** 42.00 EA EELEF			0.93 39	28.11 1,180	0.13 5	95.00 3,990	4.75 200	127.98 5,375
TOTAL DIVISION 16 ELECTRICAL				45	1,349	6	4,308	215	5,879
TOTAL FACILITY AA. ELECTRICAL				45	1,349	6	4,308	215	5,879
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				45	1,349	6	4,308	215	5,879
TOTAL BASE BID				45	1,349	6	4,308	215	5,879
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				45	1,349	6	4,308	215	5,879

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0483E2

3-140

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 483

TIME 15:10:53

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0483E2

3-141

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 483

TIME 15:10:53

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHER FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	5,879	10.0% 588	0.0% 0	7.5% 485	2.5% 174	0.0% 0	7,125	7125.11
<hr/>										
BID ITEM TOTAL		1.00 EA	5,879	588	0	485	174	0	7,125	7125.11
<hr/>										
TOTAL BASE BID			5,879	588	0	485	174	0	7,125	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
<hr/>										
TOTAL INCL ADD			5,879	588	0	485	174	0	7,125	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0483E2

3-142

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 483

TIME 15:10:53

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
	1. BUILDING TO THE 5 FOOT LINE	1.00 EA	7,125		7,125	7125.10
	TOTAL CURRENT CONTRACT COST		7,125	0	7,125	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%	0	0	0	
	ESCALATED CONTRACT COST		7,125	0	7,125	
	Government-Furnished Property		0		0	
	SUBTOTAL		7,125	0	7,125	
	Contingencies	10.0%	713	0	713	
	SUBTOTAL		7,838	0	7,838	
	SIOH (S&A)	5.0%	392	0	392	
	CURRENT WORKING ESTIMATE		8,229	0	8,229	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0483E2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 483

TIME 15:10:53

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT W/TX	** TOTAL DIRECT **	SUBCON	W/OH&P	SUBTOTAL
									AMOUNT PCT			
AA	GENERAL/PRIME		1.00	EA	45	1,349	6	4,523	5,879 100.0%	0		5,879
	TOTAL DIRECT				45	1,349	6	4,523	5,879 100.0%			

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0483E2

3-144

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 483

TIME 15:10:53

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

ID	CONTRACTOR	PH	SUBTOTAL	*** OVERHEAD *** AMOUNT	PCT	HOFC%	**** PROFIT **** AMOUNT	PCT	BOND%	OTHR%	***** TOTAL CONTRACT ***** AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		5,879	588	10.0%	0.0	485	7.5%	2.5%	0.0%	7,125	100.0%	7125.11
	TOTAL OVERHEAD & PROFIT			588	10.0%		485	7.5%					

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0483E2

3-145

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 483

TIME 15:10:53

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	45	1,349	6	4,308	215	5,879
TOTAL DIRECT	45	1,349	6	4,308	215	5,879

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0483E2

3-146

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 483

TIME 15:10:53

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	45	1,349	6	4,308	215	5,879
TOTAL DIRECT	45	1,349	6	4,308	215	5,879

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0483E2

3-147

TIME 15:10:53

EQUIPMENT SUMMARY

SUMMARY PAGE 8

		*** BOOK VALUE ***		ADJ FACTOR		ADJUSTD	BOOK OP	-- HRLY	--- UPB	**** TOTAL ****		
EQUIP	DESCRIPTION	LIFE HRS	TL HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST
EMI20	SMALL TOOLS								1.40	1.40	4	6
											-----	-----
TOTAL PROJECT EQUIPMENT HOURS											4	6

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0483E2
3-148

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 483

TIME 15:10:53

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	45	1,349
TOTAL PROJECT MANHOURS								45	1,349

* * * END OF SUMMARY REPORT * * *

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: 484
BUILDING FUNCTION: MOTOR POOL/VEHICLE MAINTENANCE

BUILDING USE:
HOURS/DAY 8
DAYS/WEEK 5

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
0 2 LAMP @ 96 WATTS/FIXT = 0 WATTS
0 4 LAMP @ 192 WATTS/FIXT = 0 WATTS
8 FOOT
96 2 LAMP @ 158 WATTS/FIXT = 15,168 WATTS
INCANDESCENT
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 1.40
AVERAGE FOOTCANDLES 20.00
TOTAL EXISTING KW 15.2
TOTAL EXISTING KWH 31,549

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/
REFLECTORS 37 WATTS/FIXT = 0 WATTS
6 2 LAMP W/
58 WATTS/FIXT = 348 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
42 FIXTURES @ 240 WATTS/FIXT = 10,080 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.93
AVERAGE FOOTCANDLES 30.00
TOTAL REPLACEMENT KW 10.4
TOTAL REPLACEMENT KWH 21,690

NET ENERGY SAVINGS

33,640 MBTU/YR

NET DOLLAR SAVINGS

\$649.02

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 15:18:09

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING 484

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0484E2

3-151

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 484

TIME 15:18:09

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DETAILED ESTIMATE

DETAIL PAGE

1. BUILDING TO THE 5 FOOT LINE	
AA. ELECTRICAL.....	1

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Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 484
 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 15:18:09

DETAILED ESTIMATE

DETAIL PAGE 1

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	53.00	2.65	83.88
WC=1100	6.00 EA EELEF			6	169	1	318	16	503
16512 9000 HIGH INTENSITY DISCHARGE									
CD=3 EL 9003 200 W HPS FIXTURE AND LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	95.00	4.75	127.98
WC=1100	42.00 EA EELEF			39	1,180	5	3,990	200	5,375
TOTAL DIVISION 16 ELECTRICAL				45	1,349	6	4,308	215	5,879
TOTAL FACILITY AA. ELECTRICAL				45	1,349	6	4,308	215	5,879
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				45	1,349	6	4,308	215	5,879
TOTAL BASE BID				45	1,349	6	4,308	215	5,879
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				45	1,349	6	4,308	215	5,879

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0484E2

3-153

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 484

TIME 15:18:09

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0484E2

3-154

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 484

TIME 15:18:09

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY	COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	5,879	10.0% 588	0.0% 0	7.5% 485	2.5% 174	0.0% 0	7,125 7125.11
BID ITEM TOTAL		1.00 EA	5,879	588	0	485	174	0	7,125 7125.11
TOTAL BASE BID			5,879	588	0	485	174	0	7,125
TOTAL ADDITIVE			0	0	0	0	0	0	0
TOTAL INCL ADD			5,879	588	0	485	174	0	7,125

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0484E2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 484

TIME 15:18:09

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00 EA	7,125		7,125	7125.10
	TOTAL CURRENT CONTRACT COST		7,125	0	7,125	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%	0	0	0	
	ESCALATED CONTRACT COST		7,125	0	7,125	
	Government-Furnished Property		0		0	
	SUBTOTAL		7,125	0	7,125	
	Contingencies	10.0%	713	0	713	
	SUBTOTAL		7,838	0	7,838	
	SIOH (S&A)	5.0%	392	0	392	
	CURRENT WORKING ESTIMATE		8,229	0	8,229	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0484E2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS H-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 484

TIME 15:18:09

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PH	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT	W/TX	** TOTAL DIRECT * AMOUNT PCT	* SUBCON * W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	45	1,349	6	4,523		5,879 100.0%	0	5,879
	TOTAL DIRECT				45	1,349	6	4,523		5,879 100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0484E2

3-157

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 484

TIME 15:18:09

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

		*** OVERHEAD ***			**** PROFIT ****			***** TOTAL CONTRACT *****					
ID	CONTRACTOR	PM	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		5,879	588	10.0%	0.0	485	7.5%	2.5%	0.0%	7,125	100.0%	7125.11
				-----			-----						
TOTAL OVERHEAD & PROFIT				588	10.0%		485	7.5%					

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0484E2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 484

TIME 15:18:09

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	45	1,349	6	4,308	215	5,879
TOTAL DIRECT	45	1,349	6	4,308	215	5,879

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0484E2

3-159

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 484

TIME 15:18:09

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	45	1,349	6	4,308	215	5,879
TOTAL DIRECT	45	1,349	6	4,308	215	5,879

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0484E2

3-160

EQUIPMENT SUMMARY

SUMMARY PAGE 8

-----		*** BOOK VALUE ***		ADJ FACTOR	ADJUSTD	BOOK OP	-- HRLY	--- UPB	**** TOTAL ****			
EQUIP	DESCRIPTION	LIFE HRS	TL HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST

EMI20	SMALL TOOLS								1.40	1.40	4	6
											-----	-----
TOTAL PROJECT EQUIPMENT HOURS											4	6

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 484

TIME 15:18:09

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	45	1,349
TOTAL PROJECT MANHOURS								45	1,349

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0484E2

3-162

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: 485
BUILDING FUNCTION: MOTOR POOL/VEHICLE MAINTENANCE

BUILDING USE: _____
HOURS/DAY 8 ELECTRIC COSTS: _____
DAYS/WEEK 5 ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
0 2 LAMP @ 96 WATTS/FIXT = 0 WATTS
0 4 LAMP @ 192 WATTS/FIXT = 0 WATTS
8 FOOT
114 2 LAMP @ 158 WATTS/FIXT = 18,012 WATTS
INCANDESCENT
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 1.67
AVERAGE FOOTCANDLES 20.00
TOTAL EXISTING KW 18.0
TOTAL EXISTING KWH 37,465

NET ENERGY SAVINGS 53,823 MBTU/YR

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/ REFLECTORS 37 WATTS/FIXT = 0 WATTS
6 2 LAMP W/ 58 WATTS/FIXT = 348 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
42 FIXTURES @ 240 WATTS/FIXT = 10,080 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.93
AVERAGE FOOTCANDLES 30.00
TOTAL REPLACEMENT KW 10.4
TOTAL REPLACEMENT KWH 21,690

NET DOLLAR SAVINGS \$1,038.44

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 15:25:24

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING 485

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0485E2

3-164

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 485

TIME 15:25:24

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DETAILED ESTIMATE	DETAIL PAGE
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AA. ELECTRICAL.....	1

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Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 485

TIME 15:25:24

DETAILED ESTIMATE

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	53.00	2.65	83.88
WC=1100	6.00 EA EELEF			6	169	1	318	16	503
16512 9000 HIGH INTENSITY DISCHARGE									
CD=3 EL 9003 200 W HPS FIXTURE AND LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	95.00	4.75	127.98
WC=1100	42.00 EA EELEF			39	1,180	5	3,990	200	5,375
TOTAL DIVISION 16 ELECTRICAL				45	1,349	6	4,308	215	5,879
TOTAL FACILITY AA. ELECTRICAL				45	1,349	6	4,308	215	5,879
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				45	1,349	6	4,308	215	5,879
TOTAL BASE BID				45	1,349	6	4,308	215	5,879
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				45	1,349	6	4,308	215	5,879

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0485E2

3-166

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 485

TIME 15:25:24

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0485E2

3-167

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 485

TIME 15:25:24

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	5,879	10.0% 588	0.0% 0	7.5% 485	2.5% 174	0.0% 0	7,125	7125.11
BID ITEM TOTAL		1.00 EA	5,879	588	0	485	174	0	7,125	7125.11
TOTAL BASE BID			5,879	588	0	485	174	0	7,125	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
TOTAL INCL ADD			5,879	588	0	485	174	0	7,125	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0485E2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 485

TIME 15:25:24

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
	1. BUILDING TO THE 5 FOOT LINE	1.00 EA	7,125		7,125	7125.10
	TOTAL CURRENT CONTRACT COST		7,125	0	7,125	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%	0	0	0	
	ESCALATED CONTRACT COST		7,125	0	7,125	
	Government-Furnished Property		0		0	
	SUBTOTAL		7,125	0	7,125	
	Contingencies	10.0%	713	0	713	
	SUBTOTAL		7,838	0	7,838	
	SIOH (S&A)	5.0%	392	0	392	
	CURRENT WORKING ESTIMATE		8,229	0	8,229	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0485E2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 485

TIME 15:25:24

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT W/TX	** TOTAL DIRECT **	SUBCON	W/OH&P	SUBTOTAL
									AMOUNT PCT			
AA	GENERAL/PRIME		1.00	EA	45	1,349	6	4,523	5,879 100.0%	0		5,879
	TOTAL DIRECT				45	1,349	6	4,523	5,879 100.0%			

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0485E2

3-170

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 485

TIME 15:25:24

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

ID	CONTRACTOR	PM	SUBTOTAL	*** OVERHEAD *** AMOUNT	PCT	HOFC%	**** PROFIT **** AMOUNT	PCT	BOND%	OTHER%	***** TOTAL CONTRACT ***** AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		5,879	588	10.0%	0.0	485	7.5%	2.5%	0.0%	7,125	100.0%	7125.11
	TOTAL OVERHEAD & PROFIT			588	10.0%		485	7.5%					

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0485E2

3-171

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 485

TIME 15:25:24

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	45	1,349	6	4,308	215	5,879
TOTAL DIRECT	45	1,349	6	4,308	215	5,879

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0485E2

3-172

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 485

TIME 15:25:24

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	45	1,349	6	4,308	215	5,879
TOTAL DIRECT	45	1,349	6	4,308	215	5,879

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0485E2

3-173

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 485

TIME 15:25:24

EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE *** ADJ FACTOR ADJUSTD BOOK OP -- HRLY --- UPB **** TOTAL ****												
EQUIP DESCRIPTION	LIFE HRS	TL	HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST
EMI20 SMALL TOOLS									1.40	1.40	4	6
TOTAL PROJECT EQUIPMENT HOURS											4	6

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0485E2

3-174

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 485

TIME 15:25:24

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	45	1,349
TOTAL PROJECT MANHOURS								45	1,349

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0485E2

3-175

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: 486
BUILDING FUNCTION: MOTOR POOL/VEHICLE MAINTENANCE

BUILDING USE:
HOURS/DAY 8
DAYS/WEEK 5

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
0 2 LAMP @ 96 WATTS/FIXT = 0 WATTS
0 4 LAMP @ 192 WATTS/FIXT = 0 WATTS
8 FOOT
93 2 LAMP @ 158 WATTS/FIXT = 14,694 WATTS
INCANDESCENT
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 1.36
AVERAGE FOOTCANDLES 20.00
TOTAL EXISTING KW 14.7
TOTAL EXISTING KWH 30,564

NET ENERGY SAVINGS 30,276 MBTU/YR

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/ REFLECTORS 37 WATTS/FIXT = 0 WATTS
6 2 LAMP W/ 58 WATTS/FIXT = 348 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
42 FIXTURES @ 240 WATTS/FIXT = 10,080 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.93
AVERAGE FOOTCANDLES 30.00
TOTAL REPLACEMENT KW 10.4
TOTAL REPLACEMENT KWH 21,690

NET DOLLAR SAVINGS \$584.12

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: 486 CONNECTOR
BUILDING FUNCTION: MOTOR POOL/VEHICLE MAINTENANCE

BUILDING USE:
HOURS/DAY 8
DAYS/WEEK 5

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
12 2 LAMP @ 96 WATTS/FIXT = 1,152 WATTS
0 4 LAMP @ 192 WATTS/FIXT = 0 WATTS
8 FOOT
0 2 LAMP @ 158 WATTS/FIXT = 0 WATTS
INCANDESCENT
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
6 1 LAMP @ 454 WATTS/FIXT = 2,724 WATTS

AVERAGE WATTS/SQ FT 1.26
AVERAGE FOOTCANDLES 25.00
TOTAL EXISTING KW 3.9
TOTAL EXISTING KWH 8,062

NET ENERGY SAVINGS 13,087 MBTU/YR

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/ REFLECTOR 37 WATTS/FIXT = 0 WATTS
4 2 LAMP W/ 58 WATTS/FIXT = 232 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
6 FIXTURES @ 300 WATTS/FIXT = 1,800 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.59
AVERAGE FOOTCANDLES 30.00
TOTAL REPLACEMENT KW 2.0
TOTAL REPLACEMENT KWH 4,227

NET DOLLAR SAVINGS \$252.49

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 15:40:45

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING 486

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

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Release 4.20

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0486E2

3-178

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486

TIME 15:40:45

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DETAILED ESTIMATE	DETAIL PAGE
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Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 486
 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 15:40:45

DETAILED ESTIMATE

DETAIL PAGE 1

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTY	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	53.00	2.65	83.88
WC=1100	6.00 EA EELEF			6	169	1	318	16	503
16512 9000 HIGH INTENSITY DISCHARGE									
CD=3 EL 9003 200 W HPS FIXTURE AND LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	95.00	4.75	127.98
WC=1100	42.00 EA EELEF			39	1,180	5	3,990	200	5,375
TOTAL DIVISION 16 ELECTRICAL				45	1,349	6	4,308	215	5,879
TOTAL FACILITY AA. ELECTRICAL				45	1,349	6	4,308	215	5,879
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				45	1,349	6	4,308	215	5,879
TOTAL BASE BID				45	1,349	6	4,308	215	5,879
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				45	1,349	6	4,308	215	5,879

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0486E2

3-180

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486

TIME 15:40:45

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0486E2

3-181

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS H-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486

TIME 15:40:45

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY	COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHER FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL								
	1.00 EA	5,879	10.0% 588	0.0% 0	7.5% 485	2.5% 174	0.0% 0	7,125	7125.11
BID ITEM TOTAL	1.00 EA	5,879	588	0	485	174	0	7,125	7125.11
TOTAL BASE BID		5,879	588	0	485	174	0	7,125	
TOTAL ADDITIVE		0	0	0	0	0	0	0	
TOTAL INCL ADD		5,879	588	0	485	174	0	7,125	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0486E2

3-182

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 486

TIME 15:40:45

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00	EA	7,125		7,125	7125.10
	TOTAL CURRENT CONTRACT COST			7,125	0	7,125	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%		0	0	0	
	ESCALATED CONTRACT COST			7,125	0	7,125	
	Government-Furnished Property			0		0	
	SUBTOTAL			7,125	0	7,125	
	Contingencies	10.0%		713	0	713	
	SUBTOTAL			7,838	0	7,838	
	SIOH (S&A)	5.0%		392	0	392	
	CURRENT WORKING ESTIMATE			8,229	0	8,229	

Estimated Construction Time

365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0486E2

3-183

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486

TIME 15:40:45

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PH	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT	W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	45	1,349	6	4,523		5,879	100.0%	0	5,879
	TOTAL DIRECT				45	1,349	6	4,523		5,879	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0486E2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS H-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486

TIME 15:40:45

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

-----			*** OVERHEAD ***			-----			**** PROFIT ****			-----			***** TOTAL CONTRACT *****		
ID	CONTRACTOR	PH	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT	COST			
AA	GENERAL/PRIME		5,879	588	10.0%	0.0	485	7.5%	2.5%	0.0%	7,125	100.0%	7125.11				
				-----			-----										
				588	10.0%		485	7.5%									
			TOTAL OVERHEAD & PROFIT														

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0486E2

3-185

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS H-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486

TIME 15:40:45

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	45	1,349	6	4,308	215	5,879
TOTAL DIRECT	45	1,349	6	4,308	215	5,879

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0486E2

3-186

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486

TIME 15:40:45

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	45	1,349	6	4,308	215	5,879
TOTAL DIRECT	45	1,349	6	4,308	215	5,879

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0486E2

3-187

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486

TIME 15:40:45

EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE ***		ADJ FACTOR	ADJUSTD	BOOK OP	--	HRLY	---	UPB	****	TOTAL	****		
EQUIP	DESCRIPTION	LIFE HRS	TL	HRLY	OWNRSH	OWNS	OVTH	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST
EMI20	SMALL TOOLS									1.40	1.40	4	6
												4	6
TOTAL PROJECT EQUIPMENT HOURS													

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0486E2

3-188

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486

TIME 15:40:45

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	45	1,349
TOTAL PROJECT MANHOURS								45	1,349

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0486E2

3-189

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 15:32:43

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING 486 CONNECTOR

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93

Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 486CE2

3-190

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486 CONNECTOR

TIME 15:32:43

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DETAILED ESTIMATE	DETAIL PAGE
1. BUILDING TO THE 5 FOOT LINE	
AA. ELECTRICAL.....	1

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Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 486 CONNECTOR
 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 15:32:43

DETAILED ESTIMATE

DETAIL PAGE 1

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	53.00	2.65	83.88
WC=1100	4.00 EA EELEF			4	112	1	212	11	336
16512 9000 HIGH INTENSITY DISCHARGE									
CD=3 EL 9003 200 W HPS FIXTURE AND LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	95.00	4.75	127.98
WC=1100	6.00 EA EELEF			6	169	1	570	29	768
TOTAL DIVISION 16 ELECTRICAL				9	281	1	782	39	1,103
TOTAL FACILITY AA. ELECTRICAL				9	281	1	782	39	1,103
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				9	281	1	782	39	1,103
TOTAL BASE BID				9	281	1	782	39	1,103
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				9	281	1	782	39	1,103

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 486CE2

3-192

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486 CONNECTOR

TIME 15:32:43

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 486CE2

3-193

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486 CONNECTOR

TIME 15:32:43

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	1,103	10.0% 110	0.0% 0	7.5% 91	2.5% 33	0.0% 0	1,337	1337.41
<hr/>										
BID ITEM TOTAL		1.00 EA	1,103	110	0	91	33	0	1,337	1337.41
<hr/>										
TOTAL BASE BID			1,103	110	0	91	33	0	1,337	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
<hr/>										
TOTAL INCL ADD			1,103	110	0	91	33	0	1,337	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 486CE2

3-194

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486 CONNECTOR

TIME 15:32:43

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
	1. BUILDING TO THE 5 FOOT LINE	1.00	EA	1,337		1,337	1337.40
	TOTAL CURRENT CONTRACT COST			1,337	0	1,337	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%		0	0	0	
	ESCALATED CONTRACT COST			1,337	0	1,337	
	Government-Furnished Property			0		0	
	SUBTOTAL			1,337	0	1,337	
	Contingencies	10.0%		134	0	134	
	SUBTOTAL			1,471	0	1,471	
	SIOH (S&A)	5.0%		74	0	74	
	CURRENT WORKING ESTIMATE			1,545	0	1,545	
	Estimated Construction Time	365	Days				

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 486CE2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS H-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486 CONNECTOR

TIME 15:32:43

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT W/TX	** TOTAL DIRECT **	SUBCON **	*****	
									AMOUNT	PCT	W/OH&P	
											SUBTOTAL	
AA	GENERAL/PRIME		1.00	EA	9	281	1	821	1,103	100.0%	0	1,103
	TOTAL DIRECT				9	281	1	821	1,103	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 486CE2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486 CONNECTOR

TIME 15:32:43

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

		*** OVERHEAD ***			**** PROFIT ****			***** TOTAL CONTRACT *****					
ID	CONTRACTOR	PM	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		1,103	110	10.0%	0.0	91	7.5%	2.5%	0.0%	1,337	100.0%	1337.40
TOTAL OVERHEAD & PROFIT				110	10.0%		91	7.5%					

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 486CE2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486 CONNECTOR

TIME 15:32:43

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	9	281	1	782	39	1,103
TOTAL DIRECT	9	281	1	782	39	1,103

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 486CE2

3-198

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486 CONNECTOR

TIME 15:32:43

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	9	281	1	782	39	1,103
TOTAL DIRECT	9	281	1	782	39	1,103

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 486CE2

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486 CONNECTOR

TIME 15:32:43

EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE ***		ADJ FACTOR		ADJUSTD		BOOK OP		--	HRLY	---	UPB	****	TOTAL	****
EQUIP	DESCRIPTION	LIFE HRS	TL	HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST	
EMI20	SMALL TOOLS									1.40	1.40	1	1	
												1	1	
TOTAL PROJECT EQUIPMENT HOURS														

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 486CE2

3-200

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 486 CONNECTOR

TIME 15:32:43

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	9	281
TOTAL PROJECT MANHOURS								9	281

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 486CE2
3-201

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: 487 AREA 3
BUILDING FUNCTION: MOTOR POOL/VEHICLE MAINTENANCE

BUILDING USE:

HOURS/DAY 8
DAYS/WEEK 5

ELECTRIC COSTS:

ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
0 2 LAMP @ 96 WATTS/FIXT = 0 WATTS
0 4 LAMP @ 192 WATTS/FIXT = 0 WATTS
8 FOOT
32 2 LAMP @ 158 WATTS/FIXT = 5,056 WATTS
INCANDESCENT
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 1.40
AVERAGE FOOTCANDLES 20.00
TOTAL EXISTING KW 5.1
TOTAL EXISTING KWH 10,516

NET ENERGY SAVINGS 11.213 MBTU/YR

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/ REFLECTORS 37 WATTS/FIXT = 0 WATTS
2 2 LAMP W/ 58 WATTS/FIXT = 116 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
14 FIXTURES @ 240 WATTS/FIXT = 3,360 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.93
AVERAGE FOOTCANDLES 30.00
TOTAL REPLACEMENT KW 3.5
TOTAL REPLACEMENT KWH 7,290

NET DOLLAR SAVINGS \$216.34

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 15:48:02

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING 487 AREA 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0487E2

3-203

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 487 AREA 3

TIME 15:48:02

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DETAILED ESTIMATE	DETAIL PAGE
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Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 487 AREA 3
 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 15:48:02

DETAILED ESTIMATE

DETAIL PAGE 1

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	53.00	2.65	83.88
WC=1100	2.00 EA EELEF		2	56	0	106	5	168	
16512 9000 HIGH INTENSITY DISCHARGE									
CD=3 EL 9003 200 W HPS FIXTURE AND LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	95.00	4.75	127.98
WC=1100	14.00 EA EELEF		13	393	2	1,330	67	1,792	
TOTAL DIVISION 16 ELECTRICAL			15	450	2	1,436	72	1,960	
TOTAL FACILITY AA. ELECTRICAL			15	450	2	1,436	72	1,960	
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE			15	450	2	1,436	72	1,960	
TOTAL BASE BID			15	450	2	1,436	72	1,960	
TOTAL ADDITIVE			0	0	0	0	0	0	
TOTAL INCL ADD LIMITED ENERGY STUDY			15	450	2	1,436	72	1,960	

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0487E2

3-205

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 487 AREA 3

TIME 15:48:02

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0487E2

3-206

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 487 AREA 3

TIME 15:48:02

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY	COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	1,960	10.0% 196	0.0% 0	7.5% 162	2.5% 58	0.0% 0	2,375 2375.04
BID ITEM TOTAL	1.00 EA	1,960	196	0	162	58	0	2,375	2375.04
TOTAL BASE BID		1,960	196	0	162	58	0	2,375	
TOTAL ADDITIVE		0	0	0	0	0	0	0	
TOTAL INCL ADD		1,960	196	0	162	58	0	2,375	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0487E2

3-207

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 487 AREA 3

TIME 15:48:02

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00	EA	2,375		2,375	2375.00
	TOTAL CURRENT CONTRACT COST			2,375	0	2,375	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%		0	0	0	
	ESCALATED CONTRACT COST			2,375	0	2,375	
	Government-Furnished Property			0		0	
	SUBTOTAL			2,375	0	2,375	
	Contingencies	10.0%		238	0	238	
	SUBTOTAL			2,613	0	2,613	
	SIOH (S&A)	5.0%		131	0	131	
	CURRENT WORKING ESTIMATE			2,743	0	2,743	
	Estimated Construction Time	365	Days				

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0487E2

3-208

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 487 AREA 3

TIME 15:48:02

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT	W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	15	450	2		1,508	1,960	100.0%	0	1,960
	TOTAL DIRECT				15	450	2		1,508	1,960	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0487E2

3-209

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 487 AREA 3

TIME 15:48:02

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

-----			*** OVERHEAD ***			-----			**** PROFIT ****			-----			***** TOTAL CONTRACT *****		
ID	CONTRACTOR	PH	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT	COST			
AA	GENERAL/PRIME		1,960	196	10.0%	0.0	162	7.5%	2.5%	0.0%	2,375	100.0%	2375.04				
				-----			-----										
				196	10.0%		162	7.5%									
			TOTAL OVERHEAD & PROFIT														

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0487E2

3-210

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 487 AREA 3

TIME 15:48:02

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	15	450	2	1,436	72	1,960
TOTAL DIRECT	15	450	2	1,436	72	1,960

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0487E2

3-211

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 487 AREA 3

TIME 15:48:02

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	15	450	2	1,436	72	1,960
TOTAL DIRECT	15	450	2	1,436	72	1,960

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0487E2

3-212

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS H-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 487 AREA 3

TIME 15:48:02

EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE *** ADJ FACTOR ADJUSTD BOOK OP -- HRLY --- UPB **** TOTAL ****													
EQUIP	DESCRIPTION	LIFE HRS	TL HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST	

EMI20	SMALL TOOLS								1.40	1.40	1	2	
											-----	-----	
TOTAL PROJECT EQUIPMENT HOURS												1	2

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0487E2

3-213

Tue 14 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 487 AREA 3

TIME 15:48:02

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	15	450
TOTAL PROJECT MANHOURS								15	450

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0487E2

3-214

FORT KNOX LIMITED ENERGY STUDY

ECO 2: IMPROVE LIGHTING WITH ENERGY EFFICIENCY LIGHTING

30 SEPTEMBER 1993

FACILITY LIGHTING REPLACEMENT

BUILDING #: 5232
BUILDING FUNCTION: MAINTENANCE SHOP/STORAGE

BUILDING USE:
HOURS/DAY 8
DAYS/WEEK 5

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING FIXTURE DATA

4 FOOT
0 1 LAMP @ 48 WATTS/FIXT = 0 WATTS
18 2 LAMP @ 96 WATTS/FIXT = 1,728 WATTS
3 4 LAMP @ 192 WATTS/FIXT = 576 WATTS
8 FOOT
0 2 LAMP @ 158 WATTS/FIXT = 0 WATTS
INCANDESCENT
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
0 1 LAMP @ 0 WATTS/FIXT = 0 WATTS
MERCURY VAPOR
0 1 LAMP @ 454 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.71
AVERAGE FOOTCANDLES 7.00

TOTAL EXISTING KW 2.3
TOTAL EXISTING KWH 4,792

REPLACEMENT FIXTURE DATA

4 FOOT
0 1 LAMP @ 37 WATTS/FIXT = 0 WATTS
0 1 LAMP W/ REFLECTORS 37 WATTS/FIXT = 0 WATTS
2 2 LAMP W/ 58 WATTS/FIXT = 116 WATTS
METAL HALIDE
0 FIXTURES @ 185 WATTS/FIXT = 0 WATTS
0 FIXTURES @ 215 WATTS/FIXT = 0 WATTS
HIGH PRESSURE SODIUM
0 FIXTURES @ 115 WATTS/FIXT = 0 WATTS
8 FIXTURES @ 188 WATTS/FIXT = 1,504 WATTS
0 FIXTURES @ 465 WATTS/FIXT = 0 WATTS

AVERAGE WATTS/SQ FT 0.70
AVERAGE FOOTCANDLES 15.00

TOTAL REPLACEMENT KW 1.6
TOTAL REPLACEMENT KWH 3,970

NET ENERGY SAVINGS

4.854 MBTU/YR

NET DOLLAR SAVINGS

\$93.66

Thu 16 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 13:01:09

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-2: BUILDING 5232

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 5232K2

3-216

Thu 16 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 5232

TIME 13:01:09

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DETAILED ESTIMATE	DETAIL PAGE
1. BUILDING TO THE 5 FOOT LINE	
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Thu 16 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-2: BUILDING 5232
 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 13:01:09

DETAILED ESTIMATE

DETAIL PAGE 1

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING									
16512 8000 FLUORESCENT - SURFACE MOUNTED T8 ELECTRONIC BALLASTS									
CD=3 EL 8004 4 FOOT 2 LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	53.00	2.65	83.88
WC=1100	2.00 EA EELEF			2	56	0	106	5	168
16512 9000 HIGH INTENSITY DISCHARGE									
CD=3 EL 9005 150 W HPS FIXTURE AND LAMP	*** UNIT COSTS: ***			0.93	28.11	0.13	89.00	4.45	121.68
WC=1100	8.00 EA EELEF			7	225	1	712	36	973
TOTAL DIVISION 16 ELECTRICAL				9	281	1	818	41	1,141
TOTAL FACILITY AA. ELECTRICAL				9	281	1	818	41	1,141
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				9	281	1	818	41	1,141
TOTAL BASE BID				9	281	1	818	41	1,141
TOTAL ADDITIVE				0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY				9	281	1	818	41	1,141

*** END OF DETAIL REPORT ***

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 5232K2

3-218

Thu 16 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 5232

TIME 13:01:09

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: ENERGY EFFICIENT LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 5232K2

3-219

Thu 16 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 5232

TIME 13:01:09

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHER FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	1,141	10.0% 114	0.0% 0	7.5% 94	2.5% 34	0.0% 0	1,383	1383.22
BID ITEM TOTAL		1.00 EA	1,141	114	0	94	34	0	1,383	1383.22
TOTAL BASE BID			1,141	114	0	94	34	0	1,383	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
TOTAL INCL ADD			1,141	114	0	94	34	0	1,383	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 5232K2
3-220

Thu 16 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 5232

TIME 13:01:09

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00	EA	1,383		1,383	1383.20
TOTAL CURRENT CONTRACT COST				1,383	0	1,383	
Cost Growth from 09/93 to 09/94 Index Values: 0000 0000				0.0%	0	0	0
ESCALATED CONTRACT COST				1,383	0	1,383	
Government-Furnished Property				0		0	
SUBTOTAL				1,383	0	1,383	
Contingencies				10.0%	138	0	138
SUBTOTAL				1,522	0	1,522	
SIOH (S&A)				5.0%	76	0	76
CURRENT WORKING ESTIMATE				1,598	0	1,598	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 5232K2

3-221

Thu 16 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 5232

TIME 13:01:09

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT	W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	9	281	1		859	1,141	100.0%	0	1,141
	TOTAL DIRECT				9	281	1		859	1,141	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 5232K2

3-222

Thu 16 Sep 1993

U.S. ARMY CORPS of ENGINEERS H-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 5232

TIME 13:01:09

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

			*** OVERHEAD ***			**** PROFIT ****			***** TOTAL CONTRACT *****				
ID	CONTRACTOR	PM	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		1,141	114	10.0%	0.0	94	7.5%	2.5%	0.0%	1,383	100.0%	1383.22
				-----			-----						
				114	10.0%		94	7.5%					
			TOTAL OVERHEAD & PROFIT										

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 5232K2

3-223

Thu 16 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 5232

TIME 13:01:09

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	9	281	1	818	41	1,141
TOTAL DIRECT	9	281	1	818	41	1,141

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 5232K2

3-224

Thu 16 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 5232

TIME 13:01:09

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	9	281	1	818	41	1,141
TOTAL DIRECT	9	281	1	818	41	1,141

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 5232K2

3-225

Thu 16 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 5232

TIME 13:01:09

EQUIPMENT SUMMARY

SUMMARY PAGE 8

EQUIP DESCRIPTION	LIFE HRS	TL HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	HRLY RATE	UPB RATE	HOURS	TOTAL COST
EMI20 SMALL TOOLS								1.40	1.40	1	1
TOTAL PROJECT EQUIPMENT HOURS										1	1

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 5232K2

3-226

Thu 16 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-2: BUILDING 5232

TIME 13:01:09

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	9	281
TOTAL PROJECT MANHOURS								9	281

*** END OF SUMMARY REPORT ***

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 5232K2

3-227

FORT KNOX LIMITED ENERGY STUDY

ECO 3.1: INSTALL PHOTOCELL LIGHTING CONTROLS TO REDUCE LIGHT LEVELS WHEN POSSIBLE
30 SEPTEMBER 1993

FACILITY LIGHTING CONTROL INSTALLATION - ON/OFF PHOTOCELLS

BUILDING #: 86 - CENTER ISLE
BUILDING FUNCTION: WAREHOUSE
BUILDING USE: HOURS/DAY 9.6
DAYS/WEEK 5

EXISTING FIXTURE DATA:
LAMP TYPE HIGH PRESSURE SODIUM
FIXTURE WATTAGE 465 WATTS
NUMBER OF FIXTURES 6
ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING LIGHTING CONTROL DATA

0 FIXTS. @ 0.465 KW @ 0% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 100% OUTPUT * 2.496 HR/YR = 6.964 KWH/YR

TOTAL EXISTING KWH 6.964

REVISED LIGHTING CONTROL DATA

6 FIXTS. @ 0.465 KW @ 0% OUTPUT * 2.246 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * HR/YR = 0 KWH/YR
6 FIXTS. @ 0.465 KW @ 100% OUTPUT * 250 HR/YR = 697 KWH/YR

TOTAL REVISED CONTROL KWH 697

NET ENERGY SAVINGS

21.98 MBTU/YR

NET DOLLAR SAVINGS

\$394 /YR

FORT KNOX LIMITED ENERGY STUDY

ECO 3.1: INSTALL PHOTOCELL LIGHTING CONTROLS TO REDUCE LIGHT LEVELS WHEN POSSIBLE
30 SEPTEMBER 1993

FACILITY LIGHTING CONTROL INSTALLATION - ON/OFF PHOTOCELLS

BUILDING #: 86 - STORAGE ISLES
BUILDING FUNCTION: WAREHOUSE

BUILDING USE:
HOURS/DAY 9.6
DAYS/WEEK 5

EXISTING FIXTURE DATA:

LAMP TYPE HIGH PRESSURE SODIUM
FIXTURE WATTAGE 240 WATTS
NUMBER OF FIXTURES 36

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING LIGHTING CONTROL DATA

0 FIXTS. @ 0.240 KW @ 0% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.240 KW @ 10% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.240 KW @ 20% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.240 KW @ 40% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.240 KW @ 60% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.240 KW @ 80% OUTPUT * 0 HR/YR = 0 KWH/YR
36 FIXTS. @ 0.240 KW @ 100% OUTPUT * 2,496 HR/YR = 21,585 KWH/YR

TOTAL EXISTING KWH

21,585

REVISED LIGHTING CONTROL DATA

16 FIXTS. @ 0.240 KW @ 0% OUTPUT * 2,246 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.240 KW @ 10% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.240 KW @ 20% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.240 KW @ 40% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.240 KW @ 60% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.240 KW @ 80% OUTPUT * HR/YR = 0 KWH/YR
16 FIXTS. @ 0.240 KW @ 100% OUTPUT * 250 HR/YR = 960 KWH/YR
20 FIXTS. @ 0.240 KW @ 100% OUTPUT * 2,496 HR/YR = 11,981 KWH/YR

TOTAL REVISED CONTROL KWH

12,941

NET ENERGY SAVINGS

29.43 MBTU/YR

NET DOLLAR SAVINGS

\$542 /YR

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 14:21:30

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-3.1: BUILDING 86

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93

Current UPB/CSI ID: ORL290

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Release 4.20

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 086E31

3-230

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 86

TIME 14:21:30

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DETAILED ESTIMATE	DETAIL PAGE
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U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 86

TIME 14:21:30

DETAILED ESTIMATE

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL		QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16050 BASIC MATERIALS AND METHODS										
16120 1100 SINGLE SOLID CONDUCTOR.										
CD=4 EL 1102	NO. 12 AWG - TYPE THW INSULATION ***	UNIT COSTS: ***			7.14	215.37	0.97	72.72	3.64	292.69
WC=1100		1.80 MLF EELEF		13	388		2	131	7	527
16900 CONTROLS AND INSTRUMENTATION										
16930 2000 PHOTO-CELL, RELAY, LIGHTING ARRESTER, RECEPTACLE AND BRACKET										
CD=3 EL 2003	PHOTOCELL FOR ON/OFF CONTROL	*** UNIT COSTS: ***			0.63	20.63	0.08	600.00	30.00	650.71
WC=1100	BASED ON FOOTCANDLE READING	5.00 EA EELEB		3	103		0	3,000	150	3,254
CD=3 EL 2004	CIRCUIT FOR CONTROL PANEL FOR	*** UNIT COSTS: ***			1.25	41.26	0.16	100.00	5.00	146.42
WC=1100	ON/OFF PHOTOCELL CONTROL	18.00 EA EELEB		23	743		3	1,800	90	2,636
TOTAL DIVISION 16 ELECTRICAL					38	1,234	5	4,931	247	6,416
TOTAL FACILITY AA. ELECTRICAL					38	1,234	5	4,931	247	6,416
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE					38	1,234	5	4,931	247	6,416
TOTAL BASE BID					38	1,234	5	4,931	247	6,416
TOTAL ADDITIVE					0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY					38	1,234	5	4,931	247	6,416

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 086E31

3-232

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 86

TIME 14:21:30

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-3: FACILITY LIGHTING CONTROLS

SCOPE OF WORK: EVALUATE USE OF LIGHTING CONTROLS TO SAVE ENERGY IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 086E31

3-233

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 86

TIME 14:21:30

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY	COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	6,416	10.0% 642	0.0% 0	7.5% 529	2.5% 190	0.0% 0	7,777 7776.63
BID ITEM TOTAL	1.00 EA	6,416	642	0	529	190	0	7,777	7776.63
TOTAL BASE BID		6,416	642	0	529	190	0	7,777	
TOTAL ADDITIVE		0	0	0	0	0	0	0	
TOTAL INCL ADD		6,416	642	0	529	190	0	7,777	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 086E31

3-234

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 86

TIME 14:21:30

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
	1. BUILDING TO THE 5 FOOT LINE	1.00	EA	7,777		7,777	7776.60
	TOTAL CURRENT CONTRACT COST			7,777	0	7,777	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%		0	0	0	
	ESCALATED CONTRACT COST			7,777	0	7,777	
	Government-Furnished Property			0		0	
	SUBTOTAL			7,777	0	7,777	
	Contingencies	10.0%		778	0	778	
	SUBTOTAL			8,554	0	8,554	
	SIOH (S&A)	5.0%		428	0	428	
	CURRENT WORKING ESTIMATE			8,982	0	8,982	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 086E31

3-235

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 86

TIME 14:21:30

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	38	1,234	5	5,177	6,416	100.0%	0	6,416
	TOTAL DIRECT				38	1,234	5	5,177	6,416	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 086E31

3-236

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 86

TIME 14:21:30

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

-----			*** OVERHEAD ***			-----			**** PROFIT ****			-----			***** TOTAL CONTRACT *****		
ID	CONTRACTOR	PM	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT	COST			
AA	GENERAL/PRIME		6,416	642	10.0%	0.0	529	7.5%	2.5%	0.0%	7,777	100.0%	7776.62				
	TOTAL OVERHEAD & PROFIT			642	10.0%		529	7.5%									

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 086E31

3-237

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 86

TIME 14:21:30

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	38	1,234	5	4,931	247	6,416
TOTAL DIRECT	38	1,234	5	4,931	247	6,416

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 086E31

3-238

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 86

TIME 14:21:30

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	38	1,234	5	4,931	247	6,416
TOTAL DIRECT	38	1,234	5	4,931	247	6,416

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 086E31

3-239

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 86

TIME 14:21:30

EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE ***		ADJ FACTOR		ADJUSTD		BOOK OP		--	HRLY	---	UPB	****	TOTAL	****
EQUIP	DESCRIPTION	LIFE HRS	TL	HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST	
EMI20	SMALL TOOLS									1.40	1.40	4	5	
												4	5	
TOTAL PROJECT EQUIPMENT HOURS														

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 086E31

3-240

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 86

TIME 14:21:30

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	38	1,234
TOTAL PROJECT MANHOURS								38	1,234

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 086E31

3-241

FORT KNOX LIMITED ENERGY STUDY

ECO 3.1: INSTALL PHOTOCELL LIGHTING CONTROLS TO REDUCE LIGHT LEVELS WHEN POSSIBLE

30 SEPTEMBER 1993

FACILITY LIGHTING CONTROL INSTALLATION - ON/OFF PHOTOCELLS

BUILDING #: 94
BUILDING FUNCTION: WAREHOUSE/MAINTENANCE SHOP

BUILDING USE:
HOURS/DAY 10
DAYS/WEEK 5

EXISTING FIXTURE DATA:

LAMP TYPE HIGH PRESSURE SODIUM
FIXTURE WATTAGE 465 WATTS
NUMBER OF FIXTURES 108

ELECTRIC COSTS:

ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING LIGHTING CONTROL DATA

0 FIXTS. @ 0.465 KW @ 0% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * 0 HR/YR = 0 KWH/YR
108 FIXTS. @ 0.465 KW @ 100% OUTPUT * 2,600 HR/YR = 130,572 KWH/YR

TOTAL EXISTING KWH 130,572

REVISED LIGHTING CONTROL DATA

72 FIXTS. @ 0.465 KW @ 0% OUTPUT * 2,350 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * 0 HR/YR = 0 KWH/YR
108 FIXTS. @ 0.465 KW @ 100% OUTPUT * 250 HR/YR = 12,555 KWH/YR
36 FIXTS. @ 0.465 KW @ 100% OUTPUT * 2,350 HR/YR = 39,339 KWH/YR

TOTAL REVISED CONTROL KWH 51,894

NET ENERGY SAVINGS

268.45 MBTU/YR

NET DOLLAR SAVINGS

\$4,811 /YR

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 13:55:40

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-3.1: BUILDING 94

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93

Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 094E31

3-243

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 94

TIME 13:55:40

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DETAILED ESTIMATE	DETAIL PAGE
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Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 94
 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 13:55:40

DETAILED ESTIMATE

DETAIL PAGE 1

BASE BID

DIVISION 16 ELECTRICAL		QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16050 BASIC MATERIALS AND METHODS										
16120 1100 SINGLE SOLID CONDUCTOR.										
CD=4 EL 1102	NO. 12 AWG - TYPE THW INSULATION ***	UNIT COSTS: ***			7.14	215.37	0.97	72.72	3.64	292.69
WC=1100		1.08 MLF EELEF		8		233	1	79	4	316
16900 CONTROLS AND INSTRUMENTATION										
16930 2000 PHOTO-CELL, RELAY, LIGHTING ARRESTER, RECEPTACLE AND BRACKET										
CD=3 EL 2003	PHOTOCELL FOR ON/OFF CONTROL	*** UNIT COSTS: ***			0.63	20.63	0.08	600.00	30.00	650.71
WC=1100	BASED ON FOOTCANDLE READING	3.00 EA EELEB		2		62	0	1,800	90	1,952
CD=3 EL 2004	CIRCUIT FOR CONTROL PANEL FOR	*** UNIT COSTS: ***			1.25	41.26	0.16	100.00	5.00	146.42
WC=1100	ON/OFF PHOTOCELL CONTROL	18.00 EA EELEB		23		743	3	1,800	90	2,636
TOTAL DIVISION 16 ELECTRICAL					32	1,037	4	3,679	184	4,904
TOTAL FACILITY AA. ELECTRICAL					32	1,037	4	3,679	184	4,904
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE					32	1,037	4	3,679	184	4,904
TOTAL BASE BID					32	1,037	4	3,679	184	4,904
TOTAL ADDITIVE					0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY					32	1,037	4	3,679	184	4,904

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 094E31

3-245

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 94

TIME 13:55:40

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-3: FACILITY LIGHTING CONTROLS

SCOPE OF WORK: EVALUATE USE OF LIGHTING CONTROLS TO SAVE ENERGY IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 094E31

3-246

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 94

TIME 13:55:40

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY	COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	4,904	10.0% 490	0.0% 0	7.5% 405	2.5% 145	0.0% 0	5,944 5943.80
BID ITEM TOTAL	1.00 EA	4,904	490	0	405	145	0	5,944	5943.80
TOTAL BASE BID		4,904	490	0	405	145	0	5,944	
TOTAL ADDITIVE		0	0	0	0	0	0	0	
TOTAL INCL ADD		4,904	490	0	405	145	0	5,944	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 094E31

3-247

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 94

TIME 13:55:40

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00	EA	5,944		5,944	5943.80
	TOTAL CURRENT CONTRACT COST			5,944	0	5,944	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%		0	0	0	
	ESCALATED CONTRACT COST			5,944	0	5,944	
	Government-Furnished Property			0		0	
	SUBTOTAL			5,944	0	5,944	
	Contingencies	10.0%		594	0	594	
	SUBTOTAL			6,538	0	6,538	
	SIOH (S&A)	5.0%		327	0	327	
	CURRENT WORKING ESTIMATE			6,865	0	6,865	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 094E31

3-248

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 94

TIME 13:55:40

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	32	1,037	4	3,862	4,904	100.0%	0	4,904
	TOTAL DIRECT				32	1,037	4	3,862	4,904	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 094E31

3-249

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 94

TIME 13:55:40

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

ID	CONTRACTOR	PM	SUBTOTAL	*** OVERHEAD *** AMOUNT	PCT	HOFC%	**** PROFIT **** AMOUNT	PCT	BOND%	OTHER%	***** TOTAL CONTRACT ***** AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		4,904	490	10.0%	0.0	405	7.5%	2.5%	0.0%	5,944	100.0%	5943.79
	TOTAL OVERHEAD & PROFIT			490	10.0%		405	7.5%					

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 094E31

3-250

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 94

TIME 13:55:40

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	32	1,037	4	3,679	184	4,904
TOTAL DIRECT	32	1,037	4	3,679	184	4,904

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 094E31

3-251

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 94

TIME 13:55:40

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	32	1,037	4	3,679	184	4,904
TOTAL DIRECT	32	1,037	4	3,679	184	4,904

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 094E31

3-252

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 94

TIME 13:55:40

EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE *** ADJ FACTOR ADJUSTD BOOK OP -- HRLY --- UPB **** TOTAL ****												
EQUIP DESCRIPTION	LIFE HRS	TL	HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST
EMI20 SMALL TOOLS									1.40	1.40	3	4
TOTAL PROJECT EQUIPMENT HOURS											3	4

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 094E31

3-253

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 94

TIME 13:55:40

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	32	1,038
TOTAL PROJECT MANHOURS								32	1,038

*** END OF SUMMARY REPORT ***

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 094E31

3-254

FORT KNOX LIMITED ENERGY STUDY

ECO 3.1: INSTALL PHOTOCELL LIGHTING CONTROLS TO REDUCE LIGHT LEVELS WHEN POSSIBLE
30 SEPTEMBER 1993

FACILITY LIGHTING CONTROL INSTALLATION - ON/OFF PHOTOCELLS

BUILDING #: 158
BUILDING FUNCTION: MOTOR REPAIR SHOP
BUILDING USE: HOURS/DAY 8.5
DAYS/WEEK 5

EXISTING FIXTURE DATA:
LAMP TYPE HIGH PRESSURE SODIUM
FIXTURE WATTAGE 465 WATTS
NUMBER OF FIXTURES 63
ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING LIGHTING CONTROL DATA

0 FIXTS. @ 0.465 KW @ 0% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * 0 HR/YR = 0 KWH/YR
63 FIXTS. @ 0.465 KW @ 100% OUTPUT * 2,210 HR/YR = 64,742 KWH/YR

TOTAL EXISTING KWH 64,742

REVISED LIGHTING CONTROL DATA

36 FIXTS. @ 0.465 KW @ 0% OUTPUT * 1,960 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * HR/YR = 0 KWH/YR
63 FIXTS. @ 0.465 KW @ 100% OUTPUT * 250 HR/YR = 7,324 KWH/YR
27 FIXTS. @ 0.465 KW @ 100% OUTPUT * 1,960 HR/YR = 24,608 KWH/YR

TOTAL REVISED CONTROL KWH 31,932

NET ENERGY SAVINGS 111.95 MBTU/YR

NET DOLLAR SAVINGS

\$2,242 /YR

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 14:11:43

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-3.1: BUILDING 158

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 158E31

3-256

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 158

TIME 14:11:43

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DETAILED ESTIMATE	DETAIL PAGE
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* * * END TABLE OF CONTENTS * * *

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 158
 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 14:11:43

DETAILED ESTIMATE

DETAIL PAGE 1

BASE BID

DIVISION 16 ELECTRICAL		QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16050 BASIC MATERIALS AND METHODS										
16120 1100 SINGLE SOLID CONDUCTOR.										
CD=4 EL 1102	NO. 12 AWG - TYPE THW INSULATION ***	UNIT COSTS: ***			7.14	215.37	0.97	72.72	3.64	292.69
WC=1100		1.08 MLF EELEF		8		233	1	79	4	316
16900 CONTROLS AND INSTRUMENTATION										
16930 2000 PHOTO-CELL, RELAY, LIGHTING ARRESTER, RECEPTACLE AND BRACKET										
CD=3 EL 2003	PHOTOCELL FOR ON/OFF CONTROL	*** UNIT COSTS: ***			0.63	20.63	0.08	600.00	30.00	650.71
WC=1100	BASED ON FOOTCANDLE READING	3.00 EA EELEB		2		62	0	1,800	90	1,952
CD=3 EL 2004	CIRCUIT FOR CONTROL PANEL FOR	*** UNIT COSTS: ***			1.25	41.26	0.16	100.00	5.00	146.42
WC=1100	ON/OFF PHOTOCELL CONTROL	6.00 EA EELEB		8		248	1	600	30	879
TOTAL DIVISION 16 ELECTRICAL					17	542	2	2,479	124	3,147
TOTAL FACILITY AA. ELECTRICAL					17	542	2	2,479	124	3,147
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE					17	542	2	2,479	124	3,147
TOTAL BASE BID					17	542	2	2,479	124	3,147
TOTAL ADDITIVE					0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY					17	542	2	2,479	124	3,147

*** END OF DETAIL REPORT ***

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 158E31

3-258

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 158

TIME 14:11:43

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-3: FACILITY LIGHTING CONTROLS

SCOPE OF WORK: EVALUATE USE OF LIGHTING CONTROLS TO SAVE ENERGY IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 158E31

3-259

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 158

TIME 14:11:43

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	3,147	10.0% 315	0.0% 0	7.5% 260	2.5% 93	0.0% 0	3,814	3814.09
<hr/>										
BID ITEM TOTAL		1.00 EA	3,147	315	0	260	93	0	3,814	3814.09
<hr/>										
TOTAL BASE BID			3,147	315	0	260	93	0	3,814	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
<hr/>										
TOTAL INCL ADD			3,147	315	0	260	93	0	3,814	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 158E31

3-260

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 158

TIME 14:11:43

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
	1. BUILDING TO THE 5 FOOT LINE	1.00 EA	3,814		3,814	3814.10
	TOTAL CURRENT CONTRACT COST		3,814	0	3,814	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%	0	0	0	
	ESCALATED CONTRACT COST		3,814	0	3,814	
	Government-Furnished Property		0		0	
	SUBTOTAL		3,814	0	3,814	
	Contingencies	10.0%	381	0	381	
	SUBTOTAL		4,196	0	4,196	
	SIOH (S&A)	5.0%	210	0	210	
	CURRENT WORKING ESTIMATE		4,405	0	4,405	
	Estimated Construction Time	365 Days				

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 158E31

3-261

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 158

TIME 14:11:43

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT W/TX	** TOTAL DIRECT * AMOUNT PCT	** SUBCON * W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	17	542	2	2,602	3,147 100.0%	0	3,147
	TOTAL DIRECT				17	542	2	2,602	3,147 100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 158E31

3-262

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 158

TIME 14:11:43

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

		*** OVERHEAD ***			**** PROFIT ****				***** TOTAL CONTRACT *****				
ID	CONTRACTOR	PM	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHER%	AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		3,147	315	10.0%	0.0	260	7.5%	2.5%	0.0%	3,814	100.0%	3814.09
	TOTAL OVERHEAD & PROFIT			315	10.0%		260	7.5%					

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 158E31

3-263

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 158

TIME 14:11:43

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	17	542	2	2,479	124	3,147
TOTAL DIRECT	17	542	2	2,479	124	3,147

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 158E31

3-264

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 158

TIME 14:11:43

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	17	542	2	2,479	124	3,147
TOTAL DIRECT	17	542	2	2,479	124	3,147

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 158E31

3-265

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 158

TIME 14:11:43

EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE ***		ADJ FACTOR	ADJUSTD	BOOK OP	--	HRLY	---	UPB	****	TOTAL	****		
EQUIP	DESCRIPTION	LIFE HRS	TL	HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST
EMI20	SMALL TOOLS									1.40	1.40	2	2
												-----	-----
TOTAL PROJECT EQUIPMENT HOURS												2	2

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 158E31

3-266

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 158

TIME 14:11:43

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	17	543
TOTAL PROJECT MANHOURS								17	543

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 158E31

3-267

FORT KNOX LIMITED ENERGY STUDY

ECO 3.1: INSTALL PHOTOCELL LIGHTING CONTROLS TO REDUCE LIGHT LEVELS WHEN POSSIBLE
30 SEPTEMBER 1993

FACILITY LIGHTING CONTROL INSTALLATION - ON/OFF PHOTOCELLS

BUILDING #: 159
BUILDING FUNCTION: MOTOR REPAIR SHOP

BUILDING USE:
HOURS/DAY 24
DAYS/WEEK 7

EXISTING FIXTURE DATA:

LAMP TYPE HIGH PRESSURE SODIUM
FIXTURE WATTAGE 465 WATTS
NUMBER OF FIXTURES 59

ELECTRIC COSTS:

ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING LIGHTING CONTROL DATA

0 FIXTS. @ 0.465 KW @ 0% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * 0 HR/YR = 0 KWH/YR
59 FIXTS. @ 0.465 KW @ 100% OUTPUT * 8,760 HR/YR = 240,331 KWH/YR

TOTAL EXISTING KW 27.44
TOTAL EXISTING KWH 240,331

REVISED LIGHTING CONTROL DATA

15 FIXTS. @ 0.465 KW @ 0% OUTPUT * 3,400 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * HR/YR = 0 KWH/YR
15 FIXTS. @ 0.465 KW @ 100% OUTPUT * 5,360 HR/YR = 37,386 KWH/YR
44 FIXTS. @ 0.465 KW @ 100% OUTPUT * 8,760 HR/YR = 176,230 KWH/YR

TOTAL REVISED CONTROL KW 20.46
TOTAL REVISED CONTROL KWH 216,616

NET ENERGY SAVINGS

80.92 MBTU/YR

NET DOLLAR SAVINGS

\$1,186 /YR

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 14:28:49

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-3.1: BUILDING 159

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93

Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 159E31

3-269

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 159

TIME 14:28:49

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DETAILED ESTIMATE	DETAIL PAGE
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Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 159

TIME 14:28:49

DETAILED ESTIMATE

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTY	DIRECT \$
16050 BASIC MATERIALS AND METHODS									
16120 1100 SINGLE SOLID CONDUCTOR.									
CD=4 EL 1102 NO. 12 AWG - TYPE THW INSULATION *** UNIT COSTS: ***	7.14				215.37	0.97	72.72	3.64	292.69
WC=1100 0.36 MLF EELEF	3				78	0	26	1	105
16900 CONTROLS AND INSTRUMENTATION									
16930 2000 PHOTO-CELL, RELAY, LIGHTING ARRESTER, RECEPTACLE AND BRACKET									
CD=3 EL 2003 PHOTOCELL FOR ON/OFF CONTROL *** UNIT COSTS: ***	0.63				20.63	0.08	600.00	30.00	650.71
WC=1100 BASED ON FOOTCANDLE READING 1.00 EA EELEB	1				21	0	600	30	651
CD=3 EL 2004 CIRCUIT FOR CONTROL PANEL FOR *** UNIT COSTS: ***	1.25				41.26	0.16	100.00	5.00	146.42
WC=1100 ON/OFF PHOTOCELL CONTROL 3.00 EA EELEB	4				124	0	300	15	439
TOTAL DIVISION 16 ELECTRICAL	7				222	1	926	46	1,195
TOTAL FACILITY AA. ELECTRICAL	7				222	1	926	46	1,195
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE	7				222	1	926	46	1,195
TOTAL BASE BID	7				222	1	926	46	1,195
TOTAL ADDITIVE	0				0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY	7				222	1	926	46	1,195

*** END OF DETAIL REPORT ***

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 159E31

3-271

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 159

TIME 14:28:49

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-3: FACILITY LIGHTING CONTROLS

SCOPE OF WORK: EVALUATE USE OF LIGHTING CONTROLS TO SAVE ENERGY IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 159E31

3-272

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 159

TIME 14:28:49

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	1,195	10.0% 120	0.0% 0	7.5% 99	2.5% 35	0.0% 0	1,449	1448.84
BID ITEM TOTAL		1.00 EA	1,195	120	0	99	35	0	1,449	1448.84
TOTAL BASE BID			1,195	120	0	99	35	0	1,449	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
TOTAL INCL ADD			1,195	120	0	99	35	0	1,449	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 159E31

3-273

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 159

TIME 14:28:49

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00 EA	1,449		1,449	1448.80
	TOTAL CURRENT CONTRACT COST		1,449	0	1,449	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%	0	0	0	
	ESCALATED CONTRACT COST		1,449	0	1,449	
	Government-Furnished Property		0		0	
	SUBTOTAL		1,449	0	1,449	
	Contingencies	10.0%	145	0	145	
	SUBTOTAL		1,594	0	1,594	
	SIOH (S&A)	5.0%	80	0	80	
	CURRENT WORKING ESTIMATE		1,673	0	1,673	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 159E31

3-274

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 159

TIME 14:28:49

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	7	222	1	972	1,195	100.0%	0	1,195
	TOTAL DIRECT				7	222	1	972	1,195	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 159E31

3-275

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 159

TIME 14:28:49

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

-----			*** OVERHEAD ***			-----			**** PROFIT ****			-----			***** TOTAL CONTRACT *****		
ID	CONTRACTOR	PH	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT	COST			
AA	GENERAL/PRIME		1,195	120	10.0%	0.0	99	7.5%	2.5%	0.0%	1,449	100.0%	1448.84				
	TOTAL OVERHEAD & PROFIT			120	10.0%		99	7.5%									

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 159E31

3-276

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 159

TIME 14:28:49

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	7	222	1	926	46	1,195
TOTAL DIRECT	7	222	1	926	46	1,195

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 159E31

3-277

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 159

TIME 14:28:49

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	7	222	1	926	46	1,195
TOTAL DIRECT	7	222	1	926	46	1,195

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 159E31

3-278

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 159

TIME 14:28:49

EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE *** ADJ FACTOR ADJUSTD BOOK OP -- HRLY --- UPB **** TOTAL ****											
EQUIP DESCRIPTION	LIFE HRS	TL HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST
EMI20 SMALL TOOLS								1.40	1.40	1	1
										-----	-----
TOTAL PROJECT EQUIPMENT HOURS										1	1

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 159E31

3-279

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 159

TIME 14:28:49

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TYS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	7	222
TOTAL PROJECT MANHOURS								7	222

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 159E31

3-280

FORT KNOX LIMITED ENERGY STUDY

ECO 3.1: INSTALL PHOTOCELL LIGHTING CONTROLS TO REDUCE LIGHT LEVELS WHEN POSSIBLE
30 SEPTEMBER 1993

FACILITY LIGHTING CONTROL INSTALLATION - ON/OFF PHOTOCELLS

BUILDING #: 2730
BUILDING FUNCTION: VEHICLE REPAIR SHOP
EXISTING FIXTURE DATA:
LAMP TYPE METAL HALIDE
FIXTURE WATTAGE 455 WATTS
NUMBER OF FIXTURES 48

BUILDING USE:
HOURS/DAY 10
DAYS/WEEK 5

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING LIGHTING CONTROL DATA

0 FIXTS. @ 0.455 KW @ 0% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 10% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 20% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 40% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 60% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 80% OUTPUT * 0 HR/YR = 0 KWH/YR
48 FIXTS. @ 0.455 KW @ 100% OUTPUT * 2,600 HR/YR = 56,784 KWH/YR

TOTAL EXISTING KWH 56,784

REVISED LIGHTING CONTROL DATA

32 FIXTS. @ 0.455 KW @ 0% OUTPUT * 1,180 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 10% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 20% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 40% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 60% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 80% OUTPUT * HR/YR = 0 KWH/YR
32 FIXTS. @ 0.455 KW @ 100% OUTPUT * 1,420 HR/YR = 20,875 KWH/YR
16 FIXTS. @ 0.455 KW @ 100% OUTPUT * 2,600 HR/YR = 18,928 KWH/YR

TOTAL REVISED CONTROL KWH 39,603

NET ENERGY SAVINGS

58.62 MBTU/YR

NET DOLLAR SAVINGS

\$1,048 /YR

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 14:36:27

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-3.1: BUILDING 2730

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93

Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 273031

3-282

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2730

TIME 14:36:27

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Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2730

TIME 14:36:27

DETAILED ESTIMATE

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL

QUANTITY UOM CREW

MANHR

LABOR

EQUIPMENT

MATERIAL

SALESTX

DIRECT \$

16050 BASIC MATERIALS AND METHODS

16120 1100 SINGLE SOLID CONDUCTOR.

CD=4 EL 1102 NO. 12 AWG - TYPE THW INSULATION *** UNIT COSTS: ***	7.14	215.37	0.97	72.72	3.64	292.69
WC=1100 1.44 MLF EELEF	10	310	1	105	5	421

16900 CONTROLS AND INSTRUMENTATION

16930 2000 PHOTO-CELL, RELAY, LIGHTING ARRESTER, RECEPTACLE AND BRACKET

CD=3 EL 2003 PHOTOCELL FOR ON/OFF CONTROL *** UNIT COSTS: ***	0.63	20.63	0.08	600.00	30.00	650.71
WC=1100 BASED ON FOOTCANDLE READING 4.00 EA EELEB	3	83	0	2,400	120	2,603

CD=3 EL 2004 CIRCUIT FOR CONTROL PANEL FOR *** UNIT COSTS: ***	1.25	41.26	0.16	100.00	5.00	146.42
WC=1100 ON/OFF PHOTOCELL CONTROL 4.00 EA EELEB	5	165	1	400	20	586

TOTAL DIVISION 16 ELECTRICAL

18 558 2 2,905 145 3,610

TOTAL FACILITY AA. ELECTRICAL

18 558 2 2,905 145 3,610

TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE

18 558 2 2,905 145 3,610

TOTAL BASE BID

18 558 2 2,905 145 3,610

TOTAL ADDITIVE

0 0 0 0 0 0

TOTAL INCL ADD LIMITED ENERGY STUDY

18 558 2 2,905 145 3,610

*** END OF DETAIL REPORT ***

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 273031

3-284

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2730

TIME 14:36:27

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-3: FACILITY LIGHTING CONTROLS

SCOPE OF WORK: EVALUATE USE OF LIGHTING CONTROLS TO SAVE ENERGY IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 273031

3-285

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 2730

TIME 14:36:27

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHER FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	3,610	10.0% 361	0.0% 0	7.5% 298	2.5% 107	0.0% 0	4,376	4375.57
BID ITEM TOTAL		1.00 EA	3,610	361	0	298	107	0	4,376	4375.57
TOTAL BASE BID			3,610	361	0	298	107	0	4,376	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
TOTAL INCL ADD			3,610	361	0	298	107	0	4,376	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 273031

3-286

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 2730

TIME 14:36:27

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00	EA	4,376		4,376	4375.60
	TOTAL CURRENT CONTRACT COST			4,376	0	4,376	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%		0	0	0	
	ESCALATED CONTRACT COST			4,376	0	4,376	
	Government-Furnished Property			0		0	
	SUBTOTAL			4,376	0	4,376	
	Contingencies	10.0%		438	0	438	
	SUBTOTAL			4,813	0	4,813	
	SIOH (S&A)	5.0%		241	0	241	
	CURRENT WORKING ESTIMATE			5,054	0	5,054	
	Estimated Construction Time	365	Days				

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 273031

3-287

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2730

TIME 14:36:27

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT	W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	18	558	2	3,050		3,610	100.0%	0	3,610
	TOTAL DIRECT				18	558	2	3,050		3,610	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 273031

3-288

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2730

TIME 14:36:27

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

-----		*** OVERHEAD ***			-----		**** PROFIT ****			-----		***** TOTAL CONTRACT *****		
ID	CONTRACTOR	PM	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT COST	
AA	GENERAL/PRIME		3,610	361	10.0%	0.0	298	7.5%	2.5%	0.0%	4,376	100.0%	4375.56	
				-----			-----							
				361	10.0%		298	7.5%						
			TOTAL OVERHEAD & PROFIT											

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 273031

3-289

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2730

TIME 14:36:27

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	18	558	2	2,905	145	3,610
TOTAL DIRECT	18	558	2	2,905	145	3,610

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 273031

3-290

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS H-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2730

TIME 14:36:27

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	18	558	2	2,905	145	3,610
TOTAL DIRECT	18	558	2	2,905	145	3,610

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 273031

3-291

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2730

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EQUIPMENT SUMMARY

SUMMARY PAGE 8

EQUIP DESCRIPTION	LIFE HRS	TL HRLY	OWNRSHP	OWNS	OVTM	OWNRSHP	EXPENSE	RATE	RATE	HOURS	COST
EMI20 SMALL TOOLS								1.40	1.40	2	2
TOTAL PROJECT EQUIPMENT HOURS										2	2

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 273031

3-292

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2730

TIME 14:36:27

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	18	558
TOTAL PROJECT MANHOURS								18	558

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 273031

3-293

FORT KNOX LIMITED ENERGY STUDY

ECO 3.1: INSTALL PHOTOCELL LIGHTING CONTROLS TO REDUCE LIGHT LEVELS WHEN POSSIBLE
30 SEPTEMBER 1993

FACILITY LIGHTING CONTROL INSTALLATION - ON/OFF PHOTOCELLS

BUILDING #: 2942
BUILDING FUNCTION: MOTOR REPAIR SHOP

BUILDING USE:
HOURS/DAY 8
DAYS/WEEK 5

EXISTING FIXTURE DATA:

LAMP TYPE HIGH PRESSURE SODIUM
FIXTURE WATTAGE 465 WATTS
NUMBER OF FIXTURES 33

ELECTRIC COSTS:

ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING LIGHTING CONTROL DATA

0 FIXTS. @ 0.465 KW @ 0% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * 0 HR/YR = 0 KWH/YR
33 FIXTS. @ 0.465 KW @ 100% OUTPUT * 2,080 HR/YR = 31,918 KWH/YR

TOTAL EXISTING KWH 31,918

REVISED LIGHTING CONTROL DATA

20 FIXTS. @ 0.465 KW @ 0% OUTPUT * 920 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * HR/YR = 0 KWH/YR
20 FIXTS. @ 0.465 KW @ 100% OUTPUT * 1,160 HR/YR = 10,788 KWH/YR
13 FIXTS. @ 0.465 KW @ 100% OUTPUT * 2,080 HR/YR = 12,574 KWH/YR

TOTAL REVISED CONTROL KWH 23,362

NET ENERGY SAVINGS

29.19 MBTU/YR

NET DOLLAR SAVINGS

\$609 /YR

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 14:43:43

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-3.1: BUILDING 2942

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93

Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294231

3-295

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2942

TIME 14:43:43

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DETAILED ESTIMATE

DETAIL PAGE

1. BUILDING TO THE 5 FOOT LINE	
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* * * END TABLE OF CONTENTS * * *

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2942

TIME 14:43:43

DETAILED ESTIMATE

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL		QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16050 BASIC MATERIALS AND METHODS										
16120 1100 SINGLE SOLID CONDUCTOR.										
CD=4 EL 1102	NO. 12 AWG - TYPE THW INSULATION *** UNIT COSTS: ***	7.14				215.37	0.97	72.72	3.64	292.69
WC=1100	1.08 MLF EELEF	8				233	1	79	4	316
16900 CONTROLS AND INSTRUMENTATION										
16930 2000 PHOTO-CELL, RELAY, LIGHTING ARRESTER, RECEPTACLE AND BRACKET										
CD=3 EL 2003	PHOTOCELL FOR ON/OFF CONTROL *** UNIT COSTS: ***	0.63				20.63	0.08	600.00	30.00	650.71
WC=1100	BASED ON FOOTCANDLE READING 3.00 EA EELEB	2				62	0	1,800	90	1,952
CD=3 EL 2004	CIRCUIT FOR CONTROL PANEL FOR *** UNIT COSTS: ***	1.25				41.26	0.16	100.00	5.00	146.42
WC=1100	ON/OFF PHOTOCELL CONTROL 4.00 EA EELEB	5				165	1	400	20	586
TOTAL DIVISION 16 ELECTRICAL		15				460	2	2,279	114	2,854
TOTAL FACILITY AA. ELECTRICAL		15				460	2	2,279	114	2,854
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE		15				460	2	2,279	114	2,854
TOTAL BASE BID		15				460	2	2,279	114	2,854
TOTAL ADDITIVE		0				0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY		15				460	2	2,279	114	2,854

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294231

3-297

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2942

TIME 14:43:43

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-3: FACILITY LIGHTING CONTROLS

SCOPE OF WORK: EVALUATE USE OF LIGHTING CONTROLS TO SAVE ENERGY IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294231

3-298

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 2942

TIME 14:43:43

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHER FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	2,854	10.0% 285	0.0% 0	7.5% 235	2.5% 84	0.0% 0	3,459	3459.15
BID ITEM TOTAL		1.00 EA	2,854	285	0	235	84	0	3,459	3459.15
TOTAL BASE BID			2,854	285	0	235	84	0	3,459	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
TOTAL INCL ADD			2,854	285	0	235	84	0	3,459	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294231

3-299

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 2942

TIME 14:43:43

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
	1. BUILDING TO THE 5 FOOT LINE	1.00	EA	3,459		3,459	3459.20
	TOTAL CURRENT CONTRACT COST			3,459	0	3,459	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%		0	0	0	
	ESCALATED CONTRACT COST			3,459	0	3,459	
	Government-Furnished Property			0		0	
	SUBTOTAL			3,459	0	3,459	
	Contingencies	10.0%		346	0	346	
	SUBTOTAL			3,805	0	3,805	
	SIOH (S&A)	5.0%		190	0	190	
	CURRENT WORKING ESTIMATE			3,995	0	3,995	
	Estimated Construction Time	365	Days				

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294231

3-300

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS H-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2942

TIME 14:43:43

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT	W/TX	** TOTAL DIRECT * AMOUNT PCT	* SUBCON * W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	15	460	2	2,392		2,854 100.0%	0	2,854
	TOTAL DIRECT				15	460	2	2,392		2,854 100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294231

3-301

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2942

TIME 14:43:43

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

ID	CONTRACTOR	PM	SUBTOTAL	*** OVERHEAD ***	AMOUNT	PCT	HOF%	**** PROFIT ****	AMOUNT	PCT	BOND%	OTHR%	***** TOTAL CONTRACT *****	AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		2,854	285	10.0%	0.0		235	7.5%	2.5%	0.0%		3,459	100.0%		3459.15
	TOTAL OVERHEAD & PROFIT			285	10.0%			235	7.5%							

REW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294231

3-302

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2942

TIME 14:43:43

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	15	460	2	2,279	114	2,854
TOTAL DIRECT	15	460	2	2,279	114	2,854

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294231

3-303

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2942

TIME 14:43:43

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	15	460	2	2,279	114	2,854
TOTAL DIRECT	15	460	2	2,279	114	2,854

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294231

3-304

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2942

TIME 14:43:43

EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE *** ADJ FACTOR ADJUSTD BOOK OP -- HRLY --- UPB **** TOTAL ****											
EQUIP DESCRIPTION	LIFE HRS	TL HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST
EMI20 SMALL TOOLS								1.40	1.40	1	2
TOTAL PROJECT EQUIPMENT HOURS										1	2

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294231

3-305

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2942

TIME 14:43:43

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	15	460
TOTAL PROJECT MANHOURS								15	460

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294231

3-306

FORT KNOX LIMITED ENERGY STUDY

ECO 3.1: INSTALL PHOTOCELL LIGHTING CONTROLS TO REDUCE LIGHT LEVELS WHEN POSSIBLE

30 SEPTEMBER 1993

FACILITY LIGHTING CONTROL INSTALLATION -- ON/OFF PHOTOCELLS

BUILDING #: 2943
BUILDING FUNCTION: MOTOR REPAIR SHOP

BUILDING USE:
HOURS/DAY 8
DAYS/WEEK 5

EXISTING FIXTURE DATA:

LAMP TYPE HIGH PRESSURE SODIUM
FIXTURE WATTAGE 465 WATTS
NUMBER OF FIXTURES 33

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING LIGHTING CONTROL DATA

0 FIXTS. @ 0.465 KW @ 0% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * 0 HR/YR = 0 KWH/YR
33 FIXTS. @ 0.465 KW @ 100% OUTPUT * 2,080 HR/YR = 31,918 KWH/YR

TOTAL EXISTING KWH

31,918

REVISED LIGHTING CONTROL DATA

20 FIXTS. @ 0.465 KW @ 0% OUTPUT * 920 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * HR/YR = 0 KWH/YR
20 FIXTS. @ 0.465 KW @ 100% OUTPUT * 1,160 HR/YR = 10,788 KWH/YR
13 FIXTS. @ 0.465 KW @ 100% OUTPUT * 2,080 HR/YR = 12,574 KWH/YR

TOTAL REVISED CONTROL KWH

23,362

NET ENERGY SAVINGS

29.19 MBTU/YR

NET DOLLAR SAVINGS

\$609 /YR

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 14:50:51

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-3.1: BUILDING 2943

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294331

3-308

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2943

TIME 14:50:51

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DETAILED ESTIMATE

DETAIL PAGE

1. BUILDING TO THE 5 FOOT LINE	
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* * * END TABLE OF CONTENTS * * *

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2943

TIME 14:50:51

DETAILED ESTIMATE

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL		QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16050 BASIC MATERIALS AND METHODS										
16120 1100 SINGLE SOLID CONDUCTOR.										
CD=4 EL 1102	NO. 12 AWG - TYPE THW INSULATION ***	UNIT COSTS: ***			7.14	215.37	0.97	72.72	3.64	292.69
WC=1100		1.08 MLF EELEF		8		233	1	79	4	316
16900 CONTROLS AND INSTRUMENTATION										
16930 2000 PHOTO-CELL, RELAY, LIGHTING ARRESTER, RECEPTACLE AND BRACKET										
CD=3 EL 2003	PHOTOCELL FOR ON/OFF CONTROL	*** UNIT COSTS: ***			0.63	20.63	0.08	600.00	30.00	650.71
WC=1100	BASED ON FOOTCANDLE READING	3.00 EA EELEB		2		62	0	1,800	90	1,952
CD=3 EL 2004	CIRCUIT FOR CONTROL PANEL FOR	*** UNIT COSTS: ***			1.25	41.26	0.16	100.00	5.00	146.42
WC=1100	ON/OFF PHOTOCELL CONTROL	4.00 EA EELEB		5		165	1	400	20	586
TOTAL DIVISION 16 ELECTRICAL					15	460	2	2,279	114	2,854
TOTAL FACILITY AA. ELECTRICAL					15	460	2	2,279	114	2,854
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE					15	460	2	2,279	114	2,854
TOTAL BASE BID					15	460	2	2,279	114	2,854
TOTAL ADDITIVE					0	0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY					15	460	2	2,279	114	2,854

*** END OF DETAIL REPORT ***

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294331

3-310

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2943

TIME 14:50:51

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-3: FACILITY LIGHTING CONTROLS

SCOPE OF WORK: EVALUATE USE OF LIGHTING CONTROLS TO SAVE ENERGY IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294331

3-311

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 2943

TIME 14:50:51

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	2,854	10.0% 285	0.0% 0	7.5% 235	2.5% 84	0.0% 0	3,459	3459.15
BID ITEM TOTAL		1.00 EA	2,854	285	0	235	84	0	3,459	3459.15
TOTAL BASE BID			2,854	285	0	235	84	0	3,459	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
TOTAL INCL ADD			2,854	285	0	235	84	0	3,459	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294331

3-312

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 2943

TIME 14:50:51

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
	1. BUILDING TO THE 5 FOOT LINE	1.00 EA	3,459		3,459	3459.20
	TOTAL CURRENT CONTRACT COST		3,459	0	3,459	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%	0	0	0	
	ESCALATED CONTRACT COST		3,459	0	3,459	
	Government-Furnished Property		0		0	
	SUBTOTAL		3,459	0	3,459	
	Contingencies	10.0%	346	0	346	
	SUBTOTAL		3,805	0	3,805	
	SIOH (S&A)	5.0%	190	0	190	
	CURRENT WORKING ESTIMATE		3,995	0	3,995	
	Estimated Construction Time	365 Days				

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294331

3-313

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2943

TIME 14:50:51

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT W/TX	AMOUNT	PCT	W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	15	460	2	2,392	2,854	100.0%	0	2,854
	TOTAL DIRECT				15	460	2	2,392	2,854	100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294331

3-314

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2943

TIME 14:50:51

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

----- *** OVERHEAD *** ----- **** PROFIT **** ----- ***** TOTAL CONTRACT *****											
ID	CONTRACTOR	PM	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT PCT UNIT COST
AA	GENERAL/PRIME		2,854	285	10.0%	0.0	235	7.5%	2.5%	0.0%	3,459 100.0% 3459.15
	TOTAL OVERHEAD & PROFIT			285	10.0%		235	7.5%			

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294331

3-315

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2943

TIME 14:50:51

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	15	460	2	2,279	114	2,854
TOTAL DIRECT	15	460	2	2,279	114	2,854

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294331

3-316

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2943

TIME 14:50:51

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	15	460	2	2,279	114	2,854
TOTAL DIRECT	15	460	2	2,279	114	2,854

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294331

3-317

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2943

TIME 14:50:51

EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE ***		ADJ FACTOR		ADJUSTD		BOOK OP		--	HRLY	---	UPB	****	TOTAL	****
EQUIP	DESCRIPTION	LIFE HRS	TL	HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST	
EMI20	SMALL TOOLS									1.40	1.40	1	2	
												-----	-----	
TOTAL PROJECT EQUIPMENT HOURS												1	2	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294331

3-318

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2943

TIME 14:50:51

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	15	460
TOTAL PROJECT MANHOURS								15	460

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294331

3-319

FORT KNOX LIMITED ENERGY STUDY

ECO 3.1: INSTALL PHOTOCELL LIGHTING CONTROLS TO REDUCE LIGHT LEVELS WHEN POSSIBLE

30 SEPTEMBER 1993

FACILITY LIGHTING CONTROL INSTALLATION - ON/OFF PHOTOCELLS

BUILDING #: 2944
BUILDING FUNCTION: TANK REPAIR SHOP

BUILDING USE:
HOURS/DAY 8
DAYS/WEEK 5

EXISTING FIXTURE DATA:

LAMP TYPE HIGH PRESSURE SODIUM
FIXTURE WATTAGE 465 WATTS
NUMBER OF FIXTURES 63

ELECTRIC COSTS:

ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING LIGHTING CONTROL DATA

0 FIXTS. @ 0.465 KW @ 0% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * 0 HR/YR = 0 KWH/YR
63 FIXTS. @ 0.465 KW @ 100% OUTPUT * 2,080 HR/YR = 60,934 KWH/YR

TOTAL EXISTING KWH 60,934

REVISED LIGHTING CONTROL DATA

36 FIXTS. @ 0.465 KW @ 0% OUTPUT * 920 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 10% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 20% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 40% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 60% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.465 KW @ 80% OUTPUT * 0 HR/YR = 0 KWH/YR
36 FIXTS. @ 0.465 KW @ 100% OUTPUT * 1,180 HR/YR = 19,418 KWH/YR
27 FIXTS. @ 0.465 KW @ 100% OUTPUT * 2,080 HR/YR = 26,114 KWH/YR

TOTAL REVISED CONTROL KWH 45,532

NET ENERGY SAVINGS

52.55 MBTU/YR

NET DOLLAR SAVINGS

\$1,096 /YR

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 15:05:25

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-3.1: BUILDING 2944

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294431

3-321

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2944

TIME 15:05:25

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DETAILED ESTIMATE	DETAIL PAGE
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* * * END TABLE OF CONTENTS * * *

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 2944
 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 15:05:25

DETAILED ESTIMATE

DETAIL PAGE 1

BASE BID

DIVISION 16 ELECTRICAL		QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16050 BASIC MATERIALS AND METHODS										
16120 1100 SINGLE SOLID CONDUCTOR.										
CD=4 EL 1102	NO. 12 AWG - TYPE THW INSULATION *** UNIT COSTS: ***	7.14				215.37	0.97	72.72	3.64	292.69
WC=1100	1.80 MLF EELEF	13				388	2	131	7	527
16900 CONTROLS AND INSTRUMENTATION										
16930 2000 PHOTO-CELL, RELAY, LIGHTING ARRESTER, RECEPTACLE AND BRACKET										
CD=3 EL 2003	PHOTOCELL FOR ON/OFF CONTROL *** UNIT COSTS: ***	0.63				20.63	0.08	600.00	30.00	650.71
WC=1100	BASED ON FOOTCANDLE READING 5.00 EA EELEB	3				103	0	3,000	150	3,254
CD=3 EL 2004	CIRCUIT FOR CONTROL PANEL FOR *** UNIT COSTS: ***	1.25				41.26	0.16	100.00	5.00	146.42
WC=1100	ON/OFF PHOTOCELL CONTROL 10.00 EA EELEB	13				413	2	1,000	50	1,464
TOTAL DIVISION 16 ELECTRICAL		28				903	4	4,131	207	5,245
TOTAL FACILITY AA. ELECTRICAL		28				903	4	4,131	207	5,245
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE		28				903	4	4,131	207	5,245
TOTAL BASE BID		28				903	4	4,131	207	5,245
TOTAL ADDITIVE		0				0	0	0	0	0
TOTAL INCL ADD LIMITED ENERGY STUDY		28				903	4	4,131	207	5,245

*** END OF DETAIL REPORT ***

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294431

3-323

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2944

TIME 15:05:25

PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-3: FACILITY LIGHTING CONTROLS

SCOPE OF WORK: EVALUATE USE OF LIGHTING CONTROLS TO SAVE ENERGY IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294431

3-324

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2944

TIME 15:05:25

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY		COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL			10.0%	0.0%	7.5%	2.5%	0.0%		
		1.00 EA	5,245	524	0	433	155	0	6,357	6356.83
BID ITEM TOTAL		1.00 EA	5,245	524	0	433	155	0	6,357	6356.83
TOTAL BASE BID			5,245	524	0	433	155	0	6,357	
TOTAL ADDITIVE			0	0	0	0	0	0	0	
TOTAL INCL ADD			5,245	524	0	433	155	0	6,357	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294431

3-325

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 2944

TIME 15:05:25

PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00	EA	6,357		6,357	6356.80
	TOTAL CURRENT CONTRACT COST			6,357	0	6,357	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%		0	0	0	
	ESCALATED CONTRACT COST			6,357	0	6,357	
	Government-Furnished Property			0		0	
	SUBTOTAL			6,357	0	6,357	
	Contingencies	10.0%		636	0	636	
	SUBTOTAL			6,992	0	6,992	
	SIOH (S&A)	5.0%		350	0	350	
	CURRENT WORKING ESTIMATE			7,342	0	7,342	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294431

3-326

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2944

TIME 15:05:25

CONTRACTOR DIRECT SUMMARY

SUMMARY PAGE 4

ID	CONTRACTOR	PM	QUANTITY	UOM	MANHRS	LABOR	EQUIPMENT	MAT W/TX	** TOTAL DIRECT * AMOUNT PCT	* SUBCON * W/OH&P	SUBTOTAL
AA	GENERAL/PRIME		1.00	EA	28	903	4	4,337	5,245 100.0%	0	5,245
	TOTAL DIRECT				28	903	4	4,337	5,245 100.0%		

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294431

3-327

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2944

TIME 15:05:25

CONTRACTOR INDIRECT SUMMARY

SUMMARY PAGE 5

----- *** OVERHEAD *** ----- **** PROFIT **** ----- ***** TOTAL CONTRACT *****													
ID	CONTRACTOR	PH	SUBTOTAL	AMOUNT	PCT	HOFC%	AMOUNT	PCT	BOND%	OTHR%	AMOUNT	PCT	UNIT COST
AA	GENERAL/PRIME		5,245	524	10.0%	0.0	433	7.5%	2.5%	0.0%	6,357	100.0%	6356.82
	TOTAL OVERHEAD & PROFIT			524	10.0%		433	7.5%					

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294431

3-328

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS H-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2944

TIME 15:05:25

CSI DIVISION SUMMARY

SUMMARY PAGE 6

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
16 ELECTRICAL	28	903	4	4,131	207	5,245
TOTAL DIRECT	28	903	4	4,131	207	5,245

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294431

3-329

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2944

TIME 15:05:25

SYSTEMS SUMMARY

SUMMARY PAGE 7

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	28	903	4	4,131	207	5,245
TOTAL DIRECT	28	903	4	4,131	207	5,245

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294431

3-330

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2944

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EQUIPMENT SUMMARY

SUMMARY PAGE 8

----- *** BOOK VALUE *** ADJ FACTOR ADJUSTD BOOK OP -- HRLY --- UPB ***** TOTAL *****											
EQUIP DESCRIPTION	LIFE HRS	TL HRLY	OWNRSH	OWNS	OVTM	OWNRSH	EXPENSE	RATE	RATE	HOURS	COST

ENI20 SMALL TOOLS								1.40	1.40	3	4
										-----	-----
TOTAL PROJECT EQUIPMENT HOURS										3	4

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294431

3-331

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2944

TIME 15:05:25

LABOR SUMMARY

SUMMARY PAGE 9

CRAFT DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** HOURS	TOTAL COST
LELEC ELECTRICIANS	20.50	0.0%	24.0%	7.49	0.00	32.91	25.79	28	904
TOTAL PROJECT MANHOURS								28	904

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 294431

3-332

FORT KNOX LIMITED ENERGY STUDY

ECO 3.1: INSTALL PHOTOCELL LIGHTING CONTROLS TO REDUCE LIGHT LEVELS WHEN POSSIBLE
30 SEPTEMBER 1993

FACILITY LIGHTING CONTROL INSTALLATION - ON/OFF PHOTOCELLS

BUILDING #: 2963
BUILDING FUNCTION: TANK REPAIR SHOP

BUILDING USE:
HOURS/DAY 8
DAYS/WEEK 5

EXISTING FIXTURE DATA:

LAMP TYPE METAL HALIDE
FIXTURE WATTAGE 455 WATTS
NUMBER OF FIXTURES 18

ELECTRIC COSTS:
ENERGY CHARGE \$0.02506 PER KWH
DEMAND CHARGE \$7.067 PER KW

EXISTING LIGHTING CONTROL DATA

0 FIXTS. @ 0.455 KW @ 0% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 10% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 20% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 40% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 60% OUTPUT * 0 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 80% OUTPUT * 0 HR/YR = 0 KWH/YR
18 FIXTS. @ 0.455 KW @ 100% OUTPUT * 2,080 HR/YR = 17,035 KWH/YR

TOTAL EXISTING KWH 17,035

REVISED LIGHTING CONTROL DATA

12 FIXTS. @ 0.455 KW @ 0% OUTPUT * 920 HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 10% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 20% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 40% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 60% OUTPUT * HR/YR = 0 KWH/YR
0 FIXTS. @ 0.455 KW @ 80% OUTPUT * HR/YR = 0 KWH/YR
12 FIXTS. @ 0.455 KW @ 100% OUTPUT * 1,160 HR/YR = 6,334 KWH/YR
6 FIXTS. @ 0.455 KW @ 100% OUTPUT * 2,080 HR/YR = 5,678 KWH/YR

TOTAL REVISED CONTROL KWH 12,012

NET ENERGY SAVINGS

17.14 MBTU/YR

NET DOLLAR SAVINGS

\$357 /YR

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 15:13:33

TITLE PAGE

LIMITED ENERGY STUDY
FT KNOX, KY
ECO-3.1: BUILDING 2963

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Julie A. Hollensbe
Estimate Prep. Date: 09/30/93
Current UPB/CSI ID: ORL290

M - C A C E S E D I T I O N
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Release 4.20

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 296331

3-334

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2963

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DETAILED ESTIMATE

DETAIL PAGE

1. BUILDING TO THE 5 FOOT LINE	
AA. ELECTRICAL.....	1

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Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 2963
 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 15:13:33

DETAILED ESTIMATE

DETAIL PAGE 1

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY	UOM	CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
<hr/>									
16050 BASIC MATERIALS AND METHODS									
16120 1100 SINGLE SOLID CONDUCTOR.									
CD=4 EL 1102 NO. 12 AWG - TYPE THW INSULATION *** UNIT COSTS: ***	7.14				215.37	0.97	72.72	3.64	292.69
WC=1100 0.72 MLF EELEF	5				155	1	52	3	211
16900 CONTROLS AND INSTRUMENTATION									
16930 2000 PHOTO-CELL, RELAY, LIGHTING ARRESTER, RECEPTACLE AND BRACKET									
CD=3 EL 2003 PHOTOCCELL FOR ON/OFF CONTROL *** UNIT COSTS: ***	0.63				20.63	0.08	600.00	30.00	650.71
WC=1100 BASED ON FOOTCANDLE READING 2.00 EA EELEB	1				41	0	1,200	60	1,301
CD=3 EL 2004 CIRCUIT FOR CONTROL PANEL FOR *** UNIT COSTS: ***	1.25				41.26	0.16	100.00	5.00	146.42
WC=1100 ON/OFF PHOTOCCELL CONTROL 4.00 EA EELEB	5				165	1	400	20	586
<hr/>									
TOTAL DIVISION 16 ELECTRICAL	11				361	2	1,652	83	2,098
<hr/>									
TOTAL FACILITY AA. ELECTRICAL	11				361	2	1,652	83	2,098
<hr/>									
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE	11				361	2	1,652	83	2,098
<hr/>									
TOTAL BASE BID	11				361	2	1,652	83	2,098
<hr/>									
TOTAL ADDITIVE	0				0	0	0	0	0
<hr/>									
TOTAL INCL ADD LIMITED ENERGY STUDY	11				361	2	1,652	83	2,098

*** END OF DETAIL REPORT ***

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 296331

3-336

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
LIMITED ENERGY STUDY / FT KNOX, KY
ECO-3.1: BUILDING 2963

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PROJECT NOTES

SUMMARY PAGE 1

PROJECT NOTES

ECO-3: FACILITY LIGHTING CONTROLS

SCOPE OF WORK: EVALUATE USE OF LIGHTING CONTROLS TO SAVE ENERGY IN
SELECTED FACILITIES AT FT KNOX.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 296331

3-337

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 2963

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BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE 2

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID	FACILITY	COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA	ELECTRICAL	1.00 EA	2,098	10.0% 210	0.0% 0	7.5% 173	2.5% 62	0.0% 0	2,543 2542.73
BID ITEM TOTAL		1.00 EA	2,098	210	0	173	62	0	2,543 2542.73
TOTAL BASE BID			2,098	210	0	173	62	0	2,543
TOTAL ADDITIVE			0	0	0	0	0	0	0
TOTAL INCL ADD			2,098	210	0	173	62	0	2,543

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 296331

3-338

Fri 17 Sep 1993

U.S. ARMY CORPS of ENGINEERS M-CACES
 LIMITED ENERGY STUDY / FT KNOX, KY
 ECO-3.1: BUILDING 2963

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PROJECT CWE SUMMARY

SUMMARY PAGE 3

ID	BID ITEM	QUANTITY	UOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1.	BUILDING TO THE 5 FOOT LINE	1.00	EA	2,543		2,543	2542.70
	TOTAL CURRENT CONTRACT COST			2,543	0	2,543	
	Cost Growth from 09/93 to 09/94 Index Values: 0000 0000	0.0%		0	0	0	
	ESCALATED CONTRACT COST			2,543	0	2,543	
	Government-Furnished Property			0		0	
	SUBTOTAL			2,543	0	2,543	
	Contingencies	10.0%		254	0	254	
	SUBTOTAL			2,797	0	2,797	
	SIOH (S&A)	5.0%		140	0	140	
	CURRENT WORKING ESTIMATE			2,937	0	2,937	

Estimated Construction Time 365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 296331

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